THE EFFECT OF RACE ON REHABILITATION UTILIZATION AMONG STROKE PATIENTS IN NORTH CAROLINA

Monique D. Cohen

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Approved by:

Peggye Dilworth-Anderson, PhD (Chair)

Ana C. G. Felix, MD

Shoou-Yih Daniel Lee, PhD

Sally C. Stearns, PhD

Sharon W. Williams, PhD

ABSTRACT

MONIQUE D. COHEN: The Effect of Race on Rehabilitation Utilization among Stroke Patients in North Carolina
(Under the direction of Peggye Dilworth-Anderson)

Stroke is one of the foremost public health problems in the United States and is a leading cause of serious, long-term disability. Rehabilitation helps stroke patients reduce the likelihood of recurrent stroke and sustained functional disability. Rehabilitation should begin once life-threatening problems have been controlled during acute hospitalization for stroke and continue thereafter based on the needs of the patient. This dissertation investigated the relationship between race and stroke rehabilitation utilization using two outcome measures. Study 1 used logit models to examine the relationship between race, hospital characteristics, and whether patients were assessed for disability while hospitalized for stroke. Study 2 used multinomial logit models to examine the relationship between race and whether patients were discharged to home, inpatient rehabilitation facilities, or skilled nursing facilities. Study 3 used interviews with discharge planners to identify factors that influence whether patients are assessed and where patients are discharged and that could contribute to racial differences in these two areas of rehabilitation utilization.

Results from Study 1 showed that Whites were less likely than African Americans to be assessed. Patients were more likely to be assessed at not-for-profit, non-teaching, or large hospitals. African Americans at for-profit hospitals had the lowest probability of being assessed. Study 2 showed that Whites were more likely to be discharged home, and African Americans were more likely to be discharged to a facility. Study 3 showed that numerous factors influence patient assessments and discharge destinations. The factors that influence whether patients are assessed include standard orders for stroke care, the

need to navigate facility admissions criteria to ensure patients can access postacute rehabilitation services, and patient clinical conditions. The factors that influence discharge destination include patient clinical indicators, patient preferences, patient support systems, financial considerations, availability of services, and whether hospitals are affiliated with postacute rehabilitation facilities. The discharge planners did not identify factors that contribute to racial differences in assessment and discharge destination. Findings from this dissertation can be used by health care providers, hospitals, policymakers, and researchers to improve the quality of stroke care, increase access to stroke rehabilitation services, and reduce health care disparities.

DEDICATION

To my mom, Leslie Cohen, for her love, support, and encouragement

and

To my dad, the late E. Reginald Cohen, for always inspiring me to achieve

TABLE OF CONTENTS

LIST OF TABLES……viii

LIST OF FIGURES…… ix

LIST OF ABBREVIATIONS…… x

Chapter

I. INTRODUCTION…… 1

Previous Research on Disparities in Stroke Rehabilitation Utilization…… 5

Conceptual Framework and Hypotheses…….. 11

Study Significance…… 17

II. DATA SOURCES…… 20

North Carolina Collaborative Stroke Registry…… 20

American Hospital Association Guide…… 25

Area Resource File…… 25

Inclusion and Exclusion Criteria…….. 26

Primary Data Collection…… 26

III. RACE, HOSPITAL CHARACTERISTICS, AND LIKELIHOOD OF RECEIVING A POST-STROKE ASSESSMENT FOR DISABILITY…… 28

Abstract…… 28

Introduction…… 29

Methods…… 30

Results…… 33

Discussion…… 38

IV. RACIAL DIFFERENCES IN DISCHARGE DESTINATION AMONG STROKE PATIENTS IN NORTH CAROLINA..... 43

Abstract..... 43

Introduction..... 44

Methods..... 45

Results..... 48

Discussion..... 52

V. TRANSITIONS OF CARE FOR STROKE PATIENTS: A QUALITATIVE STUDY OF DISCHARGE PLANNERS IN NORTH CAROLINA..... 57

Abstract..... 57

Introduction..... 58

Methods..... 60

Results..... 62

Discussion..... 71

VI. CONCLUSION..... 77

Summary of Findings..... 77

Limitations..... 79

Policy Implications and Future Research..... 82

APPENDIX..... 84

REFERENCES..... 87

LIST OF TABLES

Table

2.1 Characteristics of Hospitals in the NCCSR..... 21

2.2 Description of Study Variables..... 22

2.3 Four Possible Groups of Patients Based on Assessment Question..... 23

3.1 Descriptive Statistics for Stroke Patients by Race, %..... 34

3.2 Results for Logit Models..... 35

3.3 Predicted Probabilities for Being Assessed by Race and Hospital Characteristics, %..... 36

4.1 Descriptive Statistics for Stroke Patients by Race, %..... 49

4.2 Results for Multinomial Logit Models..... 50

4.3 Predicted Probabilities of Being Discharged Home by Race and Hospital Characteristics, %..... 52

5.1 Factors that Influence Post-stroke Assessments and Discharge Decision-making..... 63

LIST OF FIGURES

Figure

1.1 Conceptual Framework for Factors that Influence Stroke Rehabilitation Utilization…….. 11

2.1 Decision Tree for Rehabilitation Assessment and Utilization…… 23

4.1 Predicted Probabilities of Discharge Destination by Race…… 51

LIST OF ABBREVIATIONS

IRF	Inpatient rehabilitation facilities
NCCSR	North Carolina Collaborative Stroke Registry
SNF	Skilled nursing facilities
TIA	Transient ischemic attack

CHAPTER 1

INTRODUCTION

Stroke is one of the foremost public health problems in the United States. Each year, approximately 795,000 Americans suffer a stroke, 23% of which are recurrent cases (Lloyd-Jones et al., 2009). Stroke is the third leading cause of death and claimed the lives of 137,000 people in 2006 (Heron et al., 2009). In 2009, national health care expenditures related to stroke care totaled $68.9 billion in both direct and indirect costs due to hospitalization, medications, medical equipment purchases, rehabilitation, and lost employee productivity (Lloyd-Jones, 2009). Considerable geographic variation exists in stroke incidence and mortality with the highest rates observed in the southeastern region of the United States, or "Stroke Belt" (Centers for Disease Control and Prevention [CDC], 2005; Howard, Labarthe, Hu, Yoon, & Howard, 2007). These high rates are further concentrated in the "buckle" of the Stroke Belt, which includes the coastal plains of North Carolina, South Carolina, and Georgia (Casper et al., 2003). Minority populations, particularly African Americans, are disproportionately burdened by stroke. Compared to Whites, African Americans have a greater incidence and severity of stroke (Mensah, Mokdad, Ford, Greenlund, & Croft, 2005; Kuhlemeier & Stiens, 1994), earlier onset of stroke (Kissela et al., 2004), and greater mortality across stroke subtypes (Ayala et al., 2001; Gillum, 1999).

Stroke is a leading cause of long-term disability among older adults. General recovery statistics indicate that 25% of stroke survivors recover with minor impairments, 40% have moderate to severe impairments that require special care, and 10% are left with

severe impairments that require care in a long-term care facility (National Stroke Association, 2008). Six months after sustaining a stroke, nearly half of all stroke survivors are still dependent in instrumental activities of daily living such as meal preparation and medication administration (Studenski, Wallace, Duncan, Rymer, & Lai, 2001). Even individuals who score high on scales that measure stroke recovery still often suffer from some level of disability (Lai, Studenski, Duncan, & Perera, 2002).

The effects of stroke vary widely depending on the type, location, and severity of the stroke. The disabilities that result from stroke can be physical, cognitive, and emotional (CDC, 2008). Physical disabilities include paralysis, weakness, vision loss, and difficulties carrying out activities of daily living. Cognitive deficits include aphasia and other speech problems, dementia, and neglect. Emotional issues include anxiety, depression, and emotional lability, the tendency to experience sudden mood swings without provocation.

The likelihood of recurrent stroke and sustained functional disability can be reduced significantly when comprehensive rehabilitation interventions are incorporated into the patient's treatment and recovery regimen (Anderson, Eriksen, Brown, Schultz-Larsen, & Forchhammer, 2002). Rehabilitation helps stroke patients optimize neurological recovery, improve functional status, implement secondary stroke prevention measures, manage comorbidities, and promote emotional health (Schwamm et al., 2005; Shah, 2006). Comprehensive rehabilitation includes care from a multidisciplinary team of health care professionals, including physical medicine and rehabilitation physicians, neurologists, physical and occupational therapists, speech-language pathologists, and psychologists (Bates et al., 2005; Duncan et al., 2005).

Rehabilitation should begin once life-threatening problems have been controlled following a stroke (Bates et al., 2005). The earlier rehabilitation begins, the more likely patients will regain functional ability (Hayes & Carroll, 1986; Salter et al., 2006). Consequently, rehabilitation efforts in the acute care setting are critical for stroke patients.

Accordingly, comprehensive stroke care guidelines recommend that all stroke patients receive a standardized assessment during acute hospitalization, so an appropriate rehabilitation plan can be developed (Reeves, Parker, Fonarow, Smith, & Schwamm, 2010; Schwamm et al., 2005).

Rehabilitation post-discharge is also important in the pathway to recovery. The type and frequency of rehabilitation included in the patient's discharge plan depends on the severity of the stroke and the type and degree of functional impairment (Dobkin, 2005). Although stroke patients can be discharged to a variety of destinations (e.g., nursing homes, hospice, long-term care facilities, etc.), most patients are discharged to one of three primary locations. Medically stable patients with minimal deficits and adequate social support can be discharged home and may also receive follow-up care such as outpatient therapy or home health services. Patients with at least two functional disabilities who are well enough to participate in intense therapy may be discharged to inpatient rehabilitation facilities (IRF). Patients with severe disabilities who are not well enough to participate in therapy may be discharged to skilled nursing facilities (SNF). Significant variations exist with respect to the type and intensity of services provided in each rehabilitation setting (Duncan et al., 2005). For example, stroke patients at IRF receive up to three hours of daily therapy from a team of health care providers while patients at SNF might receive just a few hours of therapy per week.

The purpose of this dissertation is to investigate the relationship between race and stroke rehabilitation utilization using two outcome measures – receipt of an assessment during acute hospitalization for stroke and discharge to one of the three most common postacute destinations for stroke patients (home, IRF, SNF). Given that racial disparities exist across the stroke care continuum, it is possible that disparities also exist in these two areas of stroke rehabilitation utilization. However, little disparities research has been done using these two outcome measures. This dissertation addresses the gaps in the literature

with three distinct studies. Study 1 used logit models to examine the relationship between race, hospital characteristics, and whether patients were assessed during acute hospitalization for stroke. Study 2 used multinomial logit models to examine the relationship between race and discharge destination following acute hospitalization for stroke. Study 3 used semi-structured interviews with discharge planners to identify and describe important factors that impact assessments and discharge planning for stroke patients and that could contribute to racial differences in these two areas of utilization. The results from these three studies can be used by health care providers, hospitals, policy makers, and stroke researchers to identify ways to improve the quality of stroke care, increase access to stroke rehabilitation services, and reduce health care disparities.

Throughout this dissertation, both the words “disparities” and “differences” are used to reflect racial variations in utilization, but these words are not intended to be used interchangeably. According to the Institute of Medicine (Smedley, Stith, & Nelson, 2003), disparities are defined as “racial or ethnic differences in the quality of health care that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention.” Because the Institute of Medicine was specifically charged to assess racial differences not caused by known factors such as access to care, its definition of disparities excluded dissimilarities due to access-related factors (e.g., insurance status, distance to services, etc.). However, these access-related factors are relevant in understanding variations in the quality of care. Therefore, in this dissertation, disparities are defined as “racial or ethnic differences in the quality of health care that are not due to clinical needs, preferences, and appropriateness of intervention.”

Given this definition, Study 1 examined health disparities. Because comprehensive stroke care guidelines recommend that all stroke patients are assessed during acute hospitalization for stroke (Reeves et al., 2010; Schwamm et al., 2005), any dissimilarities in assessment would not be justified based on clinical needs, preferences, or appropriateness

of intervention. Therefore, any dissimilarities in assessment between racial groups would be inequitable and defined as disparities. Study 2 examined racial differences in discharge destination. Discharge destination is an important consideration, since patients maximize their potential for recovery when they receive rehabilitation services after being discharged from the hospital. Because clinical needs, patient preferences, and appropriateness of intervention could potentially influence discharge destination, dissimilarities between racial groups would reflect differences (not disparities) in discharge destination. Study 3, which examined the role of clinical needs, patient preferences, and appropriateness of intervention in the discharge planning process, shed light on factors that could contribute to both differences and disparities in discharge planning for stroke patients.

The following sections summarize previous research related to racial disparities in stroke rehabilitation utilization, describe the conceptual framework and hypotheses that guided this dissertation, and discuss the significance of this work.

Previous Research on Disparities in Stroke Rehabilitation Utilization

Limited research has explored potential racial disparities in assessment during acute hospitalization for stroke or discharge to postacute destinations. Most stroke disparities research has focused on racial inequities in clinical indicators such as risk factors, stroke severity, and mortality. While some stroke disparities research has examined outcomes among patients utilizing rehabilitation services (Horn, Deutscher, Smout, DeJong, & Putman, 2010; Ottenbache et al., 2008), far less research has investigated potential disparities in whether patients utilize rehabilitation services in the first place.

Although a literature search did not uncover relevant articles devoted specifically to racial disparities in assessment, several articles have focused more broadly on racial disparities in acute stroke care procedures. For example, Schwamm and colleagues (2010) examined the effect of race and ethnicity on quality of care and outcomes in ischemic

stroke. The study sample included 397,257 African American, Hispanic, and White ischemic stroke patients admitted to 1,181 hospitals from 2003 through 2008. The authors analyzed racial differences in acute stroke care procedures (e.g., intravenous tissue-type plasminogen activator administered to patients within three hours of symptom onset), discharge performance measures (e.g., antithrombotic medication administered at discharge, smoking cessation counseling), and in-hospital clinical outcomes (e.g., in-hospital mortality rate). Results indicated that African Americans were less likely than Whites to receive certain acute stroke care procedures and discharge interventions, and these differences were magnified after adjusting for patient and hospital characteristics (e.g., size, teaching status, geographical region, etc.). The differences between Hispanics and Whites were very limited, indicating a more similar quality of care for patients in those ethnic and racial groups.

Stansbury and colleagues (2005) published a review article that discussed, among other things, ethnic disparities in acute stroke care. They found evidence that African Americans were less likely than Whites to receive several, although not all, acute stroke care procedures. For example, African Americans were 54% as likely as Whites to be administered tissue-type plasminogen activator in one study (Reed, Cramer, Blough, Meyer, & Jarvik, 2001) and 20% as likely as Whites to receive tissue-type plasminogen activator in another study (Johnston et al., 2001). Several studies found that African Americans were less likely than Whites to receive angiography (Goldstein, Matchar, Hoff-Lindquist, Samsa, & Horner, 2003; Mitchell, Ballard, Matchar, Whisnant, & Samsa, 2000; Oddone, Horner, Monger, & Matchar, 1993), carotid imaging (Oddone et al., 1999), and carotid endarterectomy (Escarce, Epstein, Colby, & Schwartz, 1993; Mitchell et al., 2003).

One important fact to note is that many of the studies included in the review article were conducted within the Veterans Affairs Health Administration. Because the Veterans Affairs health system is a unique health care setting with limited differences in access to

care and limited gender diversity, results may not be generalizable to the general population. However, racial differences that exist within the Veterans Affairs health system would likely be amplified in health care settings in which access-to-care issues (e.g., due to income or insurance status) have a larger influence on the utilization of acute care procedures. Regardless of whether this is the case, results from these studies provide evidence that the quality of acute stroke care for African Americans may be lower than that for Whites and that African Americans may be less likely than Whites to utilize beneficial acute care resources and procedures. These findings support the case for investigating potential racial disparities in other areas of acute stroke care, including assessing stroke patients for disability.

While the research related to disparities in assessment is scarce, several recent studies have investigated the relationship between race and discharge destination. Gregory and Han (2009) investigated racial, income, and geographic differences in discharge destination among stroke patients in North Carolina. The authors used data from the North Carolina Discharge Database to analyze the discharge destinations of 7,810 stroke patients classified as African American, White, or another race (e.g., American Indian, Asian/Pacific Islander, etc.). Logit models were used to determine the effect of race, rural status of county, and county poverty status on discharge to IRF versus home. The variables for model 1 included race, sex, age, insurance status, comorbidity index, patient therapy costs, stroke type, county poverty status, county rural status, geographic region (i.e., east, west, Piedmont region), and number of rehabilitation beds in the county. No statistically significant racial differences were found. Results from model 2, which included all of the aforementioned variables plus an interaction term for rural and poverty status, did not differ from model 1. Model 3 included all of the variables from model 1 plus an interaction term for minority status and poverty status as well as an interaction term for minority status and rural status. Results showed that patients in the other race category were significantly more likely

to be discharged to IRF overall but were less likely to be discharged to IRF when they resided in counties with high poverty status.

In an earlier study, Gregory, Han, Morozova, and Kuhlemeier (2006) evaluated racial differences in discharge destination among stroke patients in Maryland. Using data from the Maryland Health Services Cost Review Commission, they analyzed the discharge destinations of 12,208 African American and White patients with a primary diagnosis of stroke during the year 2000. Descriptive statistics indicated that African Americans were more likely than Whites to be discharged to IRF or nursing homes and less likely than Whites to be discharged home or to SNF. Stratified analyses of discharge destination by urban status produced slightly different results. Specifically, African Americans' higher likelihood of being discharged to IRF was only true in urban areas. African Americans' higher likelihood of being discharged to nursing homes and lower likelihood of being discharged to SNF were only true in rural areas. African Americans were less likely than Whites to be discharged home regardless of urban status. Logit models were used to determine the probability of being discharged to IRF versus another destination. Covariates included age, race, sex, marital status, urban location, insurance type, comorbidity index, stroke type, and length of stay. No statistically significant racial differences existed with respect to discharge to IRF, but the interactive effect between race and urban setting was significant. Results suggested that African Americans in urban settings were more likely than Whites to be discharged to IRF.

Onukwugha and Mullins (2007) also examined racial differences in discharge destination among stroke patients in Maryland. Discharge was measured using three categories: 1) discharge home, which was considered the most favorable outcome; 2) discharge to a medical care facility, including acute care general hospitals, rehabilitation facilities, nursing facilities, on-site psychiatric wards, subacute care facilities, hospice, and other health care facilities; and 3) in-hospital mortality. Hospital discharge data from the

Maryland Health Services Cost Review Commission were used to analyze the discharges of 51,564 African American and White patients with a primary admission diagnosis of stroke from January 2000 through September 2003. Covariates in the analyses included race, sex, age, marital status, insurance status, stroke type, comorbidity index, and length of stay in an intensive care or coronary care unit. Model 1 consisted of logit models to assess racial differences in the likelihood of in-hospital mortality versus discharge to either home or a medical care facility. African American males and females both had a higher rate of mortality than White males (the reference group), but this relationship was not statistically significant. Because goodness-of-fit tests indicated the model was not well calibrated to the data, a partial proportional-odds model was used to re-estimate the model while allowing for other discharge dispositions. The authors estimated two logit models to assess the probability of dying versus being discharged home or to a medical care facility and the probability of dying or being discharged to a medical care facility versus being discharged home. They found that African Americans were more likely than White males to have less desirable outcomes (i.e., more likely to die or be discharged to a medical care facility than to be discharged home). Model 2 was an ordered logit model that examined the probability of being discharged home, being discharged to a medical care facility, or dying. African Americans were more likely than White males to die or be discharged to a medical care facility rather than be discharged home.

These three articles make an important contribution to the literature on understanding racial differences in discharge destination among stroke patients. The strengths and limitations of the studies can be used to inform future research in this area. First, some of the discharge destination variables could have been constructed differently to produce more informative results. For example, the discharge to home variable in the Gregory and Han (2009) study included patients who left the hospital against medical advice. Results from these patients could be misleading, because they do not reflect

potential disparities in discharge destination but rather individual differences in patient preferences. In the Onukwugha and Mullins (2007) article, the variable that measured discharge to a medical care facility included discharge to seven different types of facilities ranging from nursing homes to psychiatric wards. This broad range of discharge destinations likely reflected a very diverse group of stroke patients that varied widely with respect to clinical needs and appropriateness of intervention. Therefore, as the authors acknowledged in their discussion, the large number of facilities included in this variable made it impossible to gain deeper insight into racial differences in specific types of destinations to which stroke patients were discharged. Future research should define discharge destination variables based on discharge to a single location. Well-specified discharge destination variables would enable researchers to draw clearer conclusions that could be used to formulate recommendations for practice and policy.

None of the articles looked specifically at all of the three most common destinations for stroke patients (home, IRF, SNF). Gregory and colleagues (2006) discussed descriptive statistics related to the three discharge destinations, but they did not include all three discharge destinations in their analyses. Therefore, the results they presented on the three discharge destinations did not control for any of the covariates that may impact discharge destination. Including discharge to SNF in the analyses (along with discharge home and to IRF) may have yielded important findings, since descriptive statistics showed significant racial differences in discharge to SNF. This article is a good first step at considering discharge to the three most common destinations, and future research should build upon this work by using a ternary discharge destination variable as the dependent variable in statistical analyses.

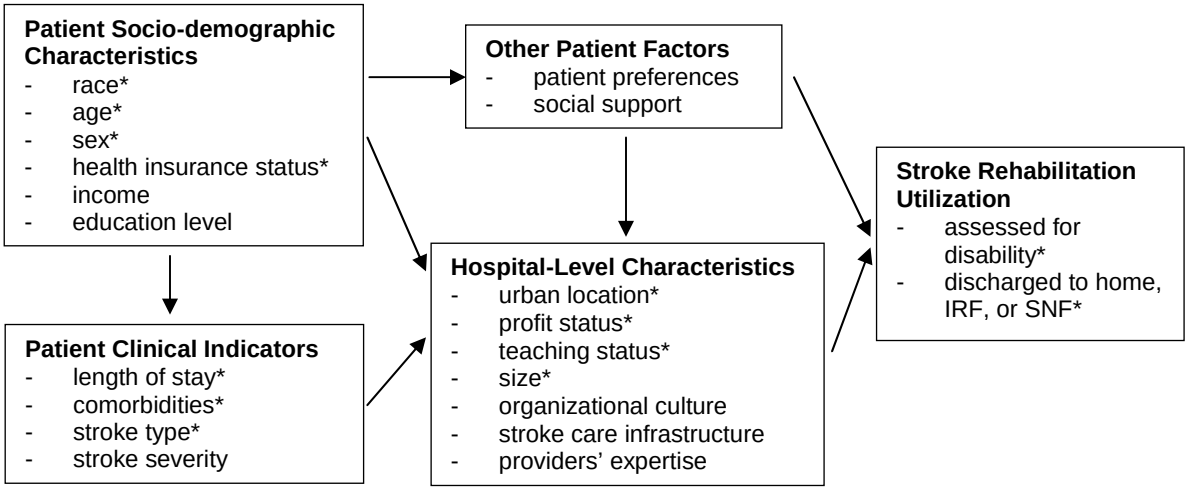
In both Gregory articles, hospital-level variables were considered (e.g., urban status of county, number of rehabilitation beds) in the analyses. Inclusion of hospital-level variables is important because it acknowledges that discharge destination is influenced by

more than just patient-level characteristics. Instead, factors such as hospital-level characteristics and rehabilitation availability variables are also important considerations.

Conceptual Framework and Hypotheses

The conceptual framework in Figure 1.1 graphically depicts the process through which various factors affect stroke rehabilitation utilization, specifically whether patients are assessed for disability during acute hospitalization for stroke and whether stroke patients are discharged to home, IRF, or SNF. The framework shows how stroke rehabilitation utilization varies across patients and types of hospitals. The variables used in this dissertation are marked with an asterisk and are discussed in greater detail below. The conceptual framework informed the research hypotheses for this dissertation.

Figure 1.1 Conceptual Framework for Factors that Influence Stroke Rehabilitation Utilization



Patient socio-demographic characteristics were hypothesized to have an indirect effect on stroke rehabilitation utilization via patient clinical indicators (e.g., the number of comorbidities increases with age), other patient factors (e.g., some racial groups may have stronger social support networks than others), and hospital-level characteristics (e.g.,

uninsured patients may receive differential care at for-profit compared to not-for-profit hospitals). Multiple socio-demographic characteristics, including race, age, sex, and health insurance status are related to quality of acute care and hospital-based health outcomes (Philbin & DiSalvo, 1998; Reeves et al., 2010). Of the patient socio-demographic characteristics, race was the primary variable of interest in this dissertation. Race is an important construct for health services research (Thomas, 2001; Williams, 1997) and is especially relevant to stroke care research because of the disparities that exist across the stroke care continuum. Compared to Whites, African Americans, have more risk factors that impede health care utilization (e.g., low socioeconomic status, lack of private insurance) and also experience social barriers to utilization (e.g., racism). In addition, research indicates that African Americans may receive a lower quality of acute stroke care than Whites, including less access to beneficial resources and procedures. Accordingly, the main hypothesis for Study 1 is:

> **H_1:** African Americans will be less likely than Whites to be assessed for disability during acute hospitalization for stroke.

Race is also associated with discharge destination. Previous research suggests that African Americans are more likely than Whites to be discharged to medical facilities compared to home (Onukwugha & Mullins, 2007) and may be more likely to be discharged to an IRF compared to other discharge destinations (Gregory et al., 2006). Given that African Americans have more severe strokes than Whites, they would likely benefit from the more intense rehabilitation offered at postacute facilities such as IRF. However, previous research outside the stroke rehabilitation literature has shown that African Americans are less likely than Whites to be discharged to SNF (Buntin, 2007; Friedman, Steinwachs,

Rathouz, & Mukamel, 2005; Mason, Auerbach, & LaPorte, 2009). Based on this information, the main hypothesis for Study 2 is:

> **H_2:** Whites will be more likely to be discharged home or to SNF, and African Americans will be more likely to be discharged to IRF.

In addition to race, patient socio-demographic characteristics included age, sex, and health insurance status. Age is significant because it is the most important unmodifiable risk factor for stroke, with the risk of stroke doubling every 10 years after age 55 (Shah, 2006). The elderly are most at risk for stroke, and elderly stroke patients experience greater severity, higher mortality, and increased likelihood of discharge to a facility compared to their younger counterparts (Fonarow et al., 2010; Shah, 2006). Furthermore, African Americans have strokes at younger ages than Whites. Several sex differences have been documented with respect to incidence and outcomes of stroke (Mitka, 2006; Wyller, 1999). Men have a higher incidence of stroke and suffer first-ever strokes at earlier ages than women, but women have worse outcomes following stroke, including higher mortality and greater degree of disability (Roquer, Campello, & Gomis, 2003). Some studies have also found that women receive differential acute care compared to men, even after controlling for explanatory variables such as stroke subtype (Smith, Lisabeth, Brown, & Morgenstern, 2005). Health insurance status is one of the primary antecedents to health care utilization, since having health insurance positively affects one's ability to pay for stroke rehabilitation services. Furthermore, the type of health insurance held, and the reimbursement regulations related to the insurance policy, may also affect patients' ability to afford services. Issues related to health insurance coverage are particularly relevant to African Americans who are more likely to have a stroke before age 65 (Kissela et al., 2004), and therefore, cannot necessarily rely on Medicare benefits to help pay for stroke rehabilitation services. Even

Medicare-eligible African Americans may experience barriers in ability to afford stroke rehabilitation services since they are more likely than Whites to supplement their Medicare benefits with Medicaid rather than private health insurance (Melancon et al., 2009; Yu et al., 2010).

Patient clinical indicators were hypothesized to have an indirect effect on stroke rehabilitation utilization via hospital-level characteristics. Patient clinical indicators included length of stay, comorbidities, and stroke type. Length of stay was included as a proxy measure for stroke severity. Stroke severity is an important measure that impacts clinical needs and dictates the type of rehabilitation services that are most appropriate for patients. Although length of stay is not an ideal proxy for stroke severity, previous studies have shown a strong correlation between stroke severity and length of stay such that patients with more severe strokes have longer stays in the hospital (Appelros, 2007; Chang et al., 2002). Many stroke patients have comorbidities such as diabetes, heart disease, and hypertension that increase stroke risk and are likely to influence stroke outcomes and rehabilitation needs. Two main types of strokes exist. Ischemic strokes, which are caused by a blockage within an artery leading to the brain, are the most common stroke type. Hemorrhagic strokes, which result from blood released directly into or surrounding the brain, are less prevalent but more damaging.

Hospital-level characteristics are hypothesized to have a direct influence on stroke rehabilitation utilization. In addition, hospital-level characteristics may moderate the effect of race on whether patients are assessed. Hospital-level characteristics included urban location, profit status, teaching status, and size. Urban, teaching, and large hospitals generally have higher quality of care and more favorable health outcomes compared to non-urban, non-teaching, and small hospitals (Ayanian & Weissman, 2002; Gillum & Johnston, 2001; Keeler et al., 1992; Kupersmith, 2005). Urban hospitals are more likely than non-urban hospitals to have access to critical resources such as technology, allied health

personnel, and providers with specialized knowledge in stroke care (Read & Levy, 2005). Without access to these resources, hospitals may perceive they lack the time and personnel to assess every patient. Consequently, the second hypothesis for Study 1 is:

H_{1A}: Urban hospitals will be more likely than non-urban hospitals to assess patients.

Compared to not-for-profit hospitals, for-profit hospitals may have greater financial pressures to save costs and make a profit. For-profit hospitals may be more pressured to adhere to practices that are in the hospital's best financial interest even if those practices are not consistent with recommended guidelines. Because of this, the third hypothesis for Study 1 is:

H_{1B}: Not-for-profit hospitals will be more likely than for-profit hospitals to assess patients.

Teaching hospitals are more likely than non-teaching hospitals to have access to comprehensive stroke care resources, including stroke units and providers with specialized stroke knowledge and expertise. Teaching hospitals may be more likely than non-teaching hospitals to implement an infrastructure that supports clinical and administrative processes for managing stroke, including adhering to recommended stroke care guidelines. Accordingly, the fourth hypothesis for Study 1 is:

H_{1C}: Teaching hospitals will be more likely than non-teaching hospitals to assess patients.

Large hospitals are more likely than small hospitals to have access to stroke care resources. Because large hospitals have a higher volume of stroke patients than small hospitals, they may also have more experience with acute stroke care processes and stroke discharge planning. Large hospital size and high volume is associated with more desirable stroke outcomes (Saposnik et al., 2007). Therefore, the fifth hypothesis for Study 1 is:

H_{1D}: Large hospitals will be more likely than small hospitals to assess patients.

In addition to the independent effects of race and hospital characteristics on whether patients are assessed, there may also be a race by hospital interaction effect. For example, urban hospitals' greater access to resources may make them more able than non-urban hospitals to adhere to recommended stroke practices in a manner that is consistent and equitable across racial groups. The potential for racial disparities may be amplified in for-profit hospitals compared to not-for-profit hospitals because of for-profit hospitals' greater pressures to save costs and increase profits. Because teaching hospitals have higher percentages of African American patients than non-teaching hospitals, they may have greater cultural competence and may therefore be more sensitive to the acute care needs of African American patients. Hospital size is positively associated with volume and some researchers have shown that African Americans experience a greater benefit in health outcomes (e.g., greater reduction in mortality) than Whites at high-volume hospitals compared to low-volume hospitals (Kim et al., 2008). This trend would result in smaller differences between African Americans and Whites at large, high-volume hospitals. Given this rationale, the last hypothesis for Study 1 is:

H_{1E}: Racial differences in assessing patients will be greater at non-urban, for-profit, non-teaching, and small hospitals compared to urban, not-for-profit, teaching and large hospitals.

Study Significance

The purpose of this dissertation is to investigate the relationship between race and stroke rehabilitation utilization, specifically post-stroke assessments for disability and discharge destination. While this dissertation builds upon and expands on previous research, several factors make this study distinct. This dissertation investigates patterns of stroke rehabilitation utilization initiated in acute care settings. Specifically, Study 1 differs from others in that it considers racial disparities in whether patients were assessed for rehabilitation services during acute hospitalization for stroke. Although comprehensive stroke care guidelines recommend that all stroke patients are assessed, anecdotal evidence indicates that many hospitals may not routinely assess patients for disability. Whether patients are assessed is an important issue because it impacts the quality of acute care and access to postacute rehabilitative care. For example, patients who are not assessed may not receive a comprehensive rehabilitation plan and may not be treated by rehabilitation therapists during the critical period immediately following stroke. Furthermore, patients who are not assessed in the hospital may not have access to postacute rehabilitation settings that require assessments prior to admission. In addition, they may be unable to access certain rehabilitation services, because some insurance companies will not pay for rehabilitation services unless an assessment by a therapist or physicians justifies the need for those services. Since comprehensive stroke care guidelines dictate that all patients are assessed for rehabilitation services, any dissimilarities in assessment between racial groups would point to disparities. The question of potential disparities in assessment for

rehabilitation is a quality of care measure that precedes the question of whether or not there are differences in actual utilization.

This dissertation considers discharge to the three most common discharge destinations for stroke patients (home, IRF, SNF). Discharge destination is important, because maximum levels of recovery can be achieved by sustaining rehabilitation efforts after discharge from the acute care setting. Since African Americans tend to experience greater levels of stroke-related disability than Whites, a larger proportion of African Americans are expected to require additional rehabilitation after discharge and to require discharge destinations that offer more intense rehabilitation regimens (e.g., IRF vs. home).

The sample population for this dissertation consists of stroke patients who received acute care in North Carolina hospitals. North Carolina is an important state to study because it is located in the buckle of the Stroke Belt, which has the highest incidence of stroke in the nation as well as increased disparities in incidence and severity of stroke (Howard et al., 2007). According to the 2006 Behavioral Risk Factor Surveillance System, 3% of non-institutionalized North Carolinians reported a history of stroke, with higher prevalence among African Americans and American Indians (Huston, 2008). Stroke prevalence in North Carolina varies significantly by region, with the highest rates centralized in the coastal plains (Casper et al., 2003). In addition to high incidence and prevalence rates, North Carolina has the fifth highest stroke mortality rate in the country and in 2004 the age adjusted stroke rate was 21.8% higher than the national rate. The economic burden of stroke in North Carolina is estimated at $1.05 billion each year (Casper et al., 2003).

Overall, this dissertation provides evidence regarding potential racial disparities in assessment for rehabilitation and racial differences in discharge destination. Results from this dissertation can inform health professionals, hospitals, policy makers, and researchers in their efforts to improve the quality of stroke care for all patients and reduce health care disparities. Specifically, the results can inform the development of both hospital

interventions designed to promote the consistent use of stroke rehabilitation guidelines and strategies intended to overcome hospital-level barriers to equitable utilization of stroke rehabilitation services.

CHAPTER 2

DATA SOURCES

A mixed methods approach was used to examine the effect of race on the utilization of stroke rehabilitation services. Study 1 used quantitative data obtained from the North Carolina Collaborative Stroke Registry (NCCSR) and the American Hospital Association Guide. Logit models were used to examine the relationship between patient race, hospital characteristics, and whether patients were assessed during acute hospitalization for stroke. Study 2 used quantitative data obtained from both of the aforementioned data sets as well as the Area Resource File. Multinomial logit models were used to examine the relationship between race and discharge destination following acute hospitalization for stroke. Study 3 used qualitative data collected using semi-structured interviews with discharge planners at hospitals in North Carolina. A grounded theory approach was used to identify factors that influenced assessments and discharge decision-making. Each data source is described in detail below.

North Carolina Collaborative Stroke Registry

The NCCSR is a part of the Paul Coverdell National Acute Stroke Registry, an initiative designed to measure, track, and improve the quality of acute stroke care, decrease the rate of premature death and disability from stroke, increase public awareness of stroke treatment and prevention, and reduce disparities in acute stroke care (CDC, 2010). The NCCSR is one of several state-based registries included in the initiative. All nonfederal acute care hospitals in North Carolina are eligible to participate in the NCCSR and between

2004 and 2008, 47 hospitals in 41 counties had opted to participate. For six months out of each year, participating hospitals identified all patients who presented to their emergency departments with symptoms of acute stroke. Using a centralized, web-based registry, hospitals input real-time data on stroke treatment of these patients. The data collected included relevant clinical indicators and medical history, patient socio-demographic variables, treatment procedures and inpatient services, and discharge status.

The data used in Study 1 and Study 2 were collected from 35 hospitals and represented patient admissions from January 2005 through April 2008. The average size of the hospitals in the sample was 292 beds, but most of the hospitals (n=23) had less than 250 beds. Table 2.1 lists the characteristics of the hospitals in the data set. The hospital characteristics are reported in aggregate to protect the anonymity of the individual hospitals that participated in the NCCSR. Approximately half of the hospitals were located in urban areas (n=18) and half were located in non-urban areas (n=17). Two of the hospitals were for-profit, and four of the hospitals were teaching hospitals. The hospitals were located throughout North Carolina but were most heavily concentrated in the central part of the state.

Table 2.1 Characteristics of Hospitals in the NCCSR

# Hospitals	≥250 beds	Urban	Teaching	For-profit
15	-	-	-	-
1	X	-	-	-
7	-	X	-	-
1	-	-	-	X
6	X	X	-	-
1	X	X	-	X
4	X	X	X	-

Note: An "X" indicates that hospitals are ≥250 beds, urban, teaching, or for-profit. A dash indicates hospitals do not have these characteristics.

Table 2.2 Description of Study Variables

Variable	Description	Type	Source
Dependent variables			
Assessed	1=assessed; 0=not assessed	Dichotomous	NCCSR
Discharge destination	1=discharged to home 2=discharged to IRF 3=discharged to SNF	Trichotomous	NCCSR
Socio-demographic characteristics			
White	1=White; 0=African American	Dichotomous	NCCSR
Age	Number of years	Continuous	NCCSR
Female	1=female; 0=male	Dichotomous	NCCSR
Medicare	1=has Medicare 0=does not have Medicare	Dichotomous	NCCSR
Other insurance	1=has another type of insurance 0=does not have another type of insurance	Dichotomous	NCCSR
Clinical indicators			
Length of stay	Number of inpatient days	Continuous	NCCSR
Comorbidities Hypertension Diabetes Prior stroke Heart disease Atrial fibrillation TIA PAD Carotid stenosis	1=has medical history 0=no medical history	Dichotomous	NCCSR
Ischemic stroke	1=ischemic stroke; 0=hemorrhagic stroke	Dichotomous	NCCSR
Hospital-level characteristics			
Urban	1=urban; 0=non-urban	Dichotomous	AHA
For-profit	1=for-profit; 0=not-for-profit	Dichotomous	AHA
Teaching	1=teaching; 0=non-teaching	Dichotomous	AHA
Large	1=hospital has ≥250 beds 0=hospital has <250 beds	Dichotomous	AHA
Discharge destination availability variables			
Hospitals w/home health Home health agencies Hospitals with IRF IRF SNF	Number of facilities	Continuous	ARF

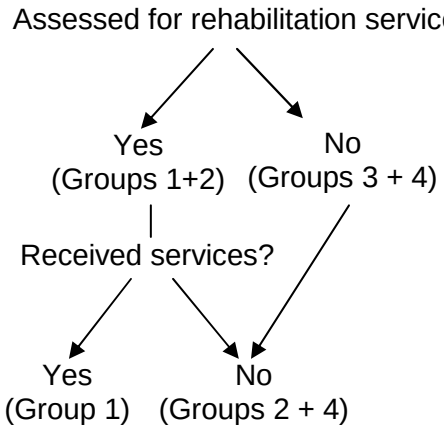
Note: AHA = American Hospital Associate database; ARF = Area Resource File; PAD = peripheral arterial disease

Table 2.3 Four Possible Groups of Patients Based on Assessment Question

	Assessed	Not assessed
Received services	Group 1	Group 3
Did not receive services	Group 2	Group 4

Table 2.2 describes the variables used in Study 1 and Study 2. Study 1 used logit models to examine the relationship between race, hospital characteristics, and whether patients received a post-stroke assessment. The dependent variable for Study 1 was a dichotomous variable that indicated whether a patient had been assessed for disability during acute hospitalization for stroke. Specifically, the NCCSR included the question, "Was the patient assessed for or received rehabilitation services?" As worded, this question allowed four possible groups of patients (Table 2.3). However, in practice, patients do not utilize rehabilitation services without first receiving an assessment (Figure 2.1). Consequently, patients would not fall into group 3. Based on this information, a "yes" response to the question was used to indicate that patients received an assessment (but may or may not have subsequently received rehabilitation services), and a "no" response indicated that patients were not assessed for rehabilitation (and accordingly, did not receive rehabilitation services).

Figure 2.1 Decision Tree for Rehabilitation Assessment and Utilization



Study 2 used multinomial logit models to examine the relationship between race and discharge destination following acute hospitalization for stroke. The NCCSR coded discharge dispositions using 16 categories, including home, IRF, SNF, long-term care facility, hospice, and inpatient mortality. The dependent variable for Study 2 was coded to indicate if patients were discharged to one of three of these categories: home (including both routine discharge home and discharge home under care of a home health service organization), IRF, or SNF.

Patient socio-demographic characteristics included race, age, sex, and insurance status. The NCCSR coded race as American Indian/Alaska Native, Asian, Black/African American, Native Hawaiian/Pacific Islander, and White. Because of small sample sizes that limited analyses, patients classified as American Indian/Alaska Native, Asian, and Native Hawaiian/Pacific Islander were excluded from the analyses. Therefore, race was coded dichotomously as White or African American. Age was measured continuously in years. Sex was coded dichotomously as female or male. Two variables were used to measure health insurance status. The first variable indicated whether patients had Medicare and the second variable indicated whether patients had another type of health insurance instead of or in addition to Medicare.

Clinical indicators included length of stay, comorbidities, and stroke type. Length of stay was calculated using arrival and discharge dates and was measured continuously in days. Comorbidities were measured using dummy variables that indicated if patients had a medical history of eight conditions that increase risk of stroke: hypertension, diabetes, prior stroke, heart disease (i.e., myocardial infarction or coronary artery disease), atrial fibrillation, transient ischemic attack (TIA), peripheral arterial disease, or carotid stenosis. Patients in the NCCSR were assigned a code using the International Classification of Diseases, 9th edition (ICD-9) to designate the stroke type. The codes related to ischemic stroke were 433 (occlusion and stenosis of precerebral arteries; specifically, 433.01, 433.11, 433.21, 433.31,

433.81, and 433.91), 434 (occlusion of cerebral arteries; specifically, 434.11 and 434.9), and 436 (acute, but ill-defined). The codes related to hemorrhagic stroke are 430 (subarachnoid hemorrhage), 431 (intracerebral hemorrhage), and 432 (other and unspecified intracranial hemorrhage). Stroke type was measured using a dummy variable to indicate if the stroke was ischemic or hemorrhagic.

American Hospital Association Guide

The American Hospital Association Guide is a directory of hospitals, health care systems, networks, alliances, government agencies, and other health care organizations (American Hospital Association [AHA], 2005). The guide includes information such as number of staffed beds, number of patient admissions, and amount of hospital expenses. Hospital characteristics obtained from the guide included county, profit status, teaching status, and size. The county of each hospital was identified in the guide and then coded using the Rural Urban Continuum Codes, a classification scheme that categorizes counties by size, degree of urbanization, and proximity to metro areas (U.S. Department of Agriculture [USDA], 2003). Continuum Codes classified counties into nine categories, but these were condensed into a dummy variable that indicated if hospitals were located in urban or non-urban counties. Profit status was coded dichotomously as for-profit or not-for-profit. Teaching status was coded dichotomously as teaching or non-teaching. Hospital size was coded as large for hospitals with at least 250 beds and small for hospitals with less than 250 beds.

Area Resource File

The Area Resource File is a collection of data from more than 50 sources such as the U.S. Census Bureau and the National Center for Health Statistics. The Area Resource File is designed to assist policymakers, researchers, and others to understand the factors

that impact health status and health care in the U.S. (Area Resource File [ARF], 2010). The data set includes county-level health resource information, including data on the availability of hospitals and health care facilities throughout the country. For Study 2, the data were used to determine the number of hospital-affiliated home health agencies, independent home health agencies, hospitals with IRF, independent IRF, and SNF in each hospital's county.

Inclusion and Exclusion Criteria

To be included in the quantitative analyses, patients had to be African American or White, at least 45 years of age and diagnosed with either an ischemic or hemorrhagic stroke. For Study 1, patients were excluded if they died during hospitalization or voluntarily discontinued care. For Study 2, patients were excluded if they were not discharged to home, IRF, or SNF. Patients with missing data were also excluded from the analyses, resulting in a final sample of 9,258 patients for Study 1 and 8,770 patients for Study 2.

Primary Data Collection

Primary data were collected via semi-structured interviews with discharge planners at hospitals in North Carolina. A stratified sampling technique was used to ensure inclusion of hospitals that varied by urban location (urban, non-urban, and rural), teaching status (teaching and non-teaching), and profit status (for-profit and not-for-profit). All of the hospitals in North Carolina were separated into five categories that represented each type of nonfederal acute care hospital in the state: 1) teaching hospitals; 2) urban, not-for-profit hospitals; 3) non-urban, not-for-profit hospitals; 4) rural, not-for-profit hospitals, and 5) for-profit hospitals. Two hospitals from each list were selected for a total of ten hospitals. Each hospital was called and an attempt was made to speak to someone who participated in discharge planning for stroke patients and was knowledgeable about stroke care in the

hospital. Once an appropriate person to interview was identified, she was given information about the purpose of the study and was asked to participate in the study. If the person agreed to participate, a date and time was scheduled to complete the interview. If an appropriate person to interview could not be reached after ten attempts or the person declined to participate in the study, a hospital from the same category was selected in its place. Recruitment continued until data saturation was reached.

Interviews were conducted via telephone and audio-taped. Each interview lasted approximately 30 to 45 minutes and was guided by a semi-structured interview protocol. Given the limited amount of knowledge in this area, semi-structured interviews were an appropriate methodology for data collection. Semi-structured interviews are designed with open-ended protocols that allow for flexibility during the interview process. While some of the questions were planned in advance, other questions were generated during the interview based on interesting issues and themes that emerged during the discussion. The interview protocol used in this study included general questions about the stroke population at the participant's hospital, decision-making related to stroke care and discharge destinations, and the influence of race and hospital characteristics on stroke care and decision-making (Appendix).

CHAPTER 3

RACE, HOSPITAL CHARACTERISTICS, AND LIKELIHOOD OF RECEIVING A POST-STROKE ASSESSMENT FOR DISABILITY

Abstract

Background and purpose: Stroke care guidelines recommend that all stroke patients are assessed to identify disability and develop an appropriate rehabilitation plan. The purpose of this study was to investigate the relationship between race, hospital characteristics, and whether stroke patients in North Carolina were assessed.

Methods: The sample included 9,258 African American and White stroke patients. Logit models were used to test the relationship between race, hospital characteristics, and being assessed. Predicted probabilities were calculated to determine the likelihood of being assessed given race and hospital characteristics.

Results: Age, length of stay, and ischemic stroke diagnosis were each significantly associated with being assessed. Overall, 92% of patients were assessed. Whites were less likely than African Americans to be assessed, and these differences were small but statistically significant. Patients receiving care at not-for-profit, non-teaching, or large hospitals were more likely to be assessed than patients at for-profit, teaching, or small hospitals, respectively. For-profit status and small size were the hospital characteristics associated with the lowest probability of being assessed. African Americans at for-profit hospitals had the lowest probability of being assessed (82.2%).

Conclusion: In general, African Americans had a higher probability of being assessed than Whites. The probability of being assessed was moderated by hospital characteristics.

Hospitals should implement protocols to ensure that all patients receive a standard of care consistent with recommended guidelines.

Introduction

Stroke is one of the foremost public health problems in the United States. Each year, approximately 795,000 Americans suffer a stroke (Lloyd-Jones et al., 2009). The highest rates of stroke incidence and mortality are observed in the southeastern region of the United States, or "Stroke Belt" (CDC, 2005; Howard et al., 2007). These high rates are further concentrated in the "buckle" of the Stroke Belt, which includes the coastal plains of North Carolina, South Carolina, and Georgia (Casper et al., 2003). Considerable racial disparities exist across the stroke care continuum. Specifically, compared to Whites, African Americans have a greater risk, incidence, and severity of stroke and greater mortality across stroke subtypes (Ayala et al., 2001; Gillum, 1999; Kuhlemeier & Stiens, 1994; Mensah et al., 2005; Rastenyte, Tuomilehto, & Sarti, 1998; Sacco et al., 2001).

Stroke is a leading cause of serious long-term disability and results in physical, cognitive, and emotional impairments (CDC, 2008). More than half of stroke patients are left with moderate impairments or severe disabilities that require special care (National Stroke Association, 2008). The likelihood of sustained functional disability following a stroke can be reduced significantly when a comprehensive rehabilitation plan is incorporated into the patient's treatment and recovery regimen (Andersen et al., 2002). Accordingly, comprehensive stroke care guidelines recommend that all stroke patients receive a standardized assessment to identify disability, so an appropriate rehabilitation plan can be developed (Reeves et al., 2010; Schwamm et al., 2005). Stroke assessments should be completed shortly after life-threatening problems have been controlled during acute hospitalization, so rehabilitation efforts can begin early in the patient's recovery process.

Early rehabilitation efforts increase the likelihood that patients will regain functional ability and avoid potential complications.

Currently, it is not known if hospitals routinely assess stroke patients for disability to determine rehabilitation needs. Some research suggests stroke patients do not always receive a level of care consistent with recommended guidelines (Schwamm et al., 2005). Other research has shown that compliance with stroke care guidelines, particularly recommendations related to rehabilitation, varies across hospitals and types of patients (Abilleira, Gallofré, Ribera, Sánchez, & Tresserras, 2009). Hospital characteristics such as urban location, profit status, teaching status, and size may be related to organizational factors that influence whether patients are assessed (e.g., dedicated stroke personnel, providers with specialized stroke knowledge). Given existing racial differences in other areas of stroke care, racial differences may also exist with respect to which stroke patients are assessed. Racial differences could be exacerbated depending on the type of hospital at which patients receive care (Kim et al., 2008).

The purpose of this study was to determine if stroke patients at a sample of hospitals in North Carolina were routinely assessed for rehabilitation services during acute hospitalization for stroke, if there were racial differences with respect to which patients received an assessment, and if hospital-level characteristics affected the likelihood of receiving an assessment. The hypotheses were as follows: 1) Whites will be more likely than African Americans to be assessed; 2) patients will have a higher probability of being assessed at urban, not-for-profit, teaching, and large hospitals; and 3) racial differences in being assessed will be greatest at non-urban, for-profit, non-teaching, and small hospitals.

Methods

Data for this study were taken from the North Carolina Collaborative Stroke Registry (NCCSR), one of several state-based registries included in the CDC-funded Paul Coverdell

National Acute Stroke Registry. The goals and design of the NCCSR have been described elsewhere (George et al., 2009). The registry is open to all nonfederal North Carolina hospitals with a dedicated emergency department. For six months out of each year, hospitals identified all patients who presented to their emergency departments with symptoms of acute stroke. Using a centralized, web-based registry, hospitals input real-time data on stroke treatment of these patients. The data collected included relevant clinical indicators and medical history, patient socio-demographic variables, treatment procedures and inpatient services, and discharge status.

This study used registry data from 2005 through 2008 and included 11,848 patients who received a diagnosis of stroke. Patients were excluded from the analyses if they were younger than 45 years (n=846), died during hospitalization (n=1,265), or voluntarily discontinued care (n=32). Because of small sample sizes that limited analyses, patients who were classified as American Indian, Alaskan Native, Asian, Pacific Islander, or multiracial were also excluded (n=257). A total of 190 patients (2%) was excluded due to missing data, resulting in an analyses cohort of 9,258 African American and White patients from 35 hospitals.

Measures

Patient socio-demographic characteristics and clinical indicators included race, age, sex, insurance status, length of stay, comorbidities, and stroke type. Race was coded as White or African American. Age was measured continuously in years. Sex was coded as female or male. Insurance status was measured using two dummy variables that indicated if the patient had Medicare and any other form of insurance. Length of stay was calculated using admission and discharge dates and was measured continuously in days. Comorbidities were measured using dummy variables that indicated a history of eight conditions that increase risk for stroke: hypertension, diabetes, prior stroke, heart disease

(i.e., myocardial infarction or coronary artery disease), atrial fibrillation, TIA, peripheral arterial disease, or carotid stenosis. The International Classification of Diseases, 9th edition was used to classify stroke type as either ischemic (codes 433, 4343, and 436) or hemorrhagic (codes 430, 431, and 432).

Hospital characteristics included urban location, profit status, teaching status, and size. The 2003 Urban Influence Codes, a classification scheme that categorizes counties by size, degree of urbanization, and proximity to metro areas, were used to classify the hospitals as either urban or non-urban (USDA, 2003). The remaining hospital characteristics were obtained through the American Hospital Association database (AHA, 2005). Hospitals were defined as for-profit or not-for-profit, teaching or non-teaching, and large (≥250 beds) or small (<250 beds). In addition to patient- and hospital-level characteristics, three dummy variables for years 2006, 2007, and 2008 were included to control for trends in assessment over time.

Statistical Analyses

Descriptive statistics about the sample were calculated and differences by race were determined using *t*-tests and X^2 analyses. Given the binary dependent variable used in this study (assessed vs. not assessed), logistic regression was used to analyze the data. The initial model included hospital fixed effects to control for any unobserved and unmeasured heterogeneity between hospitals that could influence the likelihood of being assessed. However, the logit models with hospital fixed effects were unstable and would not run properly. Instead, logit models without hospital fixed effects were used. To determine if hospital fixed effects would have added to the analyses, a linear probability model was run both with and without hospital fixed effects. Although linear probability models are not preferred for data with binary outcomes, comparing the models with and without hospital fixed effects provided an opportunity to determine whether omitting hospital fixed effects

would be disadvantageous for the logit model. A comparison of the two models indicated that the hospital fixed effects did not make a large difference in the results. Because the addition of fixed effects would have been the only advantage to using the linear probability models over the logit models, the logit models were preferred for the analyses.

Two logit models were included in the analyses. Model 1 included all of the aforementioned patient and hospital characteristics as well as the year dummy variables. Model 2 also included four race and hospital interactions terms: White*urban, White*for-profit, White*teaching, and White*large. Both models controlled for clustering within hospitals and were estimated using robust standard errors. Results from Model 2 were used to calculate the predicted probability of being assessed given race and hospital characteristics. Stata version 11 software was used for all of the analyses (StataCorp, 2009).

Results

Table 3.1 summarizes descriptive information for the patients included in the analyses. A total of 92% of the sample was assessed for disability, and African Americans were more likely than Whites to be assessed. Slightly more than half (51%) of the sample was female. The racial distribution of the sample was 73% White and 27% African American. Significant racial differences existed with respect to the socio-demographic characteristics and clinical indicators. While the average age of the total sample was 70 years, African Americans were significantly younger than Whites by a mean of seven years. Whites were more likely than African Americans to have Medicare and to have another type of insurance instead of or in addition to Medicare. African Americans were more likely to be uninsured. African Americans spent more days in the hospital, were more likely to have had a hemorrhagic stroke, and were more likely to have a medical history of hypertension, diabetes, and prior stroke. Whites were more likely to have a medical history of heart disease, TIA,

Table 3.1 Descriptive Statistics for Stroke Patients by Race, %

	African American (n = 2,536)	White (n = 6,722)	Total (n = 9,258)
Patient-level characteristics			
Dependent Variable***			
Assessed	94.2	91.8	92.4
Age***			
Mean (SD), years	65 (12.6)	72 (12.4)	70 (12.8)
Sex*			
Female	53.1	50.6	51.3
Male	46.9	49.4	48.7
Insurance			
Medicare***	53.3	70.6	65.9
Other insurance**	57.7	61.2	60.3
No insurance***	14.8	5.8	8.2
Length of stay***			
Mean (SD), days	7.3 (8.4)	5.9 (7.1)	6.3 (7.5)
Comorbidities			
Hypertension***	83.2	72.1	75.2
Diabetes***	39.5	29.3	32.1
Prior Stroke***	32.4	27.2	28.6
Heart disease***	19.0	28.5	25.9
Atrial fibrillation***	8.0	15.9	13.7
TIA***	6.2	10.3	9.2
PAD	3.4	3.8	3.7
Carotid stenosis***	1.7	4.4	3.6
Stroke type***			
Hemorrhagic	16.8	13.7	14.5
Ischemic	83.2	86.3	85.5
Hospital-level characteristics			
Urban***	79.8	75.3	76.5
For-profit***	2.4	7.7	6.3
Teaching***	27.7	15.2	18.6
Large***	80.8	74.6	76.3

Note: Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05; PAD = peripheral arterial disease

atrial fibrillation, and carotid stenosis. Most patients received care at hospitals that were urban (77%), not-for-profit (94%), non-teaching (81%), and large (76%). African Americans were more likely to be treated at hospitals that were urban, teaching, and large, while Whites were more likely to be treated at for-profit hospitals.

Table 3.2 Results for Logit Models (n=9,258)

Variable	Model 1	Model 2
Socio-demographic characteristics		
White	-.405 (.115)***	-.285 (.189)
Age	.032 (.007)***	.033 (.007)***
Female	.094 (.106)	.089 (.106)
Medicare	-.022 (.125)	-.021 (.124)
Other insurance	-.106 (.127)	-.101 (.127)
Clinical indicators		
Length of stay	.257 (.050)***	.257 (.050)***
Comorbidities		
Hypertension	.179 (.108)	.178 (.109)
Diabetes	.070 (.097)	.068 (.096)
Prior stroke	.202 (.112)	.203 (.112)
Heart disease	-.161 (.083)	-.167 (.081)*
Atrial fibrillation	-.020 (.130)	-.025 (.131)
TIA	-.086 (.169)	-.093 (.169)
Peripheral arterial disease	.404 (.268)	.424 (.272)
Carotid stenosis	-.073 (.162)	-.086 (.163)
Ischemic stroke	1.190 (.139)***	1.186 (.139)***
Hospital-level characteristics		
Urban	.244 (.165)	.302 (.241)
For-profit	-.810 (.295)**	-1.525 (.210)***
Teaching	-.895 (.332)**	-.917 (.439)*
Large	1.190 (.212)***	1.327 (.287)***
Race-Hospital interaction terms		
White x Urban		-.090 (.281)
White x For-profit		.847 (.193)***
White x Teaching		-.018 (.188)
White x Large		-.182 (.269)
Year control variables		
2006	.525 (.224)*	.523 (.223)*
2007	.348 (.197)	.352 (.196)
2008	.287 (.262)	.295 (.263)

Note: Robust standard errors are reported in parentheses. Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05

The first hypothesis was that Whites would be more likely than African Americans to be assessed. However, Model 1 shows that Whites were less likely than African Americans to be assessed (Table 3.2). Older age, longer length of stay, and current diagnosis of ischemic stroke were positively associated with being assessed. For-profit and teaching hospitals were less likely to assess patients than not-for-profit and non-teaching hospitals, respectively. Large hospitals were more likely than small hospitals to assess patients. Model 2, which included race by hospital interaction terms, was used to calculate predicted probabilities for being assessed. Table 3.3 presents predicted probabilities by hospital characteristics for African Americans, Whites, and the total combined sample. Results from the table are discussed in detail below.

Table 3.3 Predicted Probabilities for Being Assessed by Race and Hospital Characteristics, %

	African American	White	Total
Hospital Characteristics			
Urban**	94.4 (92.6-96.2)	92.2 (90.5-93.9)	92.9 (91.3-94.5)
Non-urban	92.8 (90.9-94.8)	90.7 (88.9-92.5)	91.4 (90.0-92.8)
For-profit*	82.2 (80.2-84.2)	86.5 (82.2-90.8)	85.4 (81.9-88.9)
Not-for-profit***	94.6 (93.1-96.0)	92.1 (90.7-93.5)	92.8 (91.4-94.2)
Teaching **	88.9 (83.8-93.9)	85.5 (81.8-89.3)	86.5 (82.6-90.5)
Non-teaching***	94.6 (93.0-96.3)	92.9 (91.2-94.5)	93.4 (91.8-94.9)
Large***	95.7 (94.1-97.3)	93.8 (92.2-95.4)	94.4 (92.9-96.0)
Small	87.3 (84.5-90.2)	84.6 (82.0-87.1)	85.5 (83.7-87.2)

Note: 95% confidence intervals are reported in parentheses. Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05

Urban location

Hypothesis 2 predicted that patients would have a higher probability of being assessed at urban hospitals. Results showed that the probability of being assessed did not differ significantly between urban and non-urban hospitals (p=.125). No significant within-

race differences existed at either urban or non-urban hospitals. Hypothesis 3 predicted that racial differences in assessment would be greater at non-urban hospitals, but no differences existed. At urban hospitals, African Americans were 2.2 percentage points more likely than Whites to be assessed (p=.001). At non-urban hospitals, African Americans were 2.1 percentage points more likely to be assessed, but this relationship was not statistically significant.

Profit status

Hypothesis 2 predicted that patients would have a higher probability of being assessed at not-for-profit hospitals. Consistent with this hypothesis, the probability of being assessed was 7.4 percentage points lower at for-profit hospitals compared to not-for-profit hospitals (p<.001). African Americans were 12.4 percentage points less likely to be assessed at for-profit hospitals compared to not-for-profit hospitals (p<.001). Similarly, Whites were 5.6 percentage points less likely to be assessed at for-profit hospitals compared to not-for-profit hospitals (p=.029). According to hypothesis 3, racial differences in being assessed would be greater at for-profit hospitals. Compared to Whites, African Americans were 2.5 percentage points more likely to be assessed at not-for-profit hospitals (p<.001) but 4.3 percentage points less likely to be assessed at for-profit hospitals (p=.019).

Teaching status

Contrary to hypothesis 2, which predicted that the probability of being assessed would be higher at teaching hospitals, the probability of being assessed was 6.9 percentage points lower at teaching hospitals compared to non-teaching hospitals (89.5% vs. 93.4%; p=.006). African Americans' likelihood of being assessed at a non-teaching hospital compared to a teaching hospital was not statistically different, but the difference was approaching significance (p=.054). Whites were 7.4 percentage points more likely to be

assessed at non-teaching hospitals compared to teaching hospitals (p=.003). Hypothesis 3 predicted that racial differences would be greatest at non-teaching hospitals. Contrary to this hypothesis, African Americans were 3.4 percentage points more likely than Whites to be assessed at teaching hospitals (p=.009) but 1.7 percentage points more likely to be assessed at non-teaching hospitals (p<.001).

Size

Consistent with the second hypothesis that patients would have a higher probability of being assessed at large hospitals, the probability of being assessed was 8.9 percentage points higher at large hospitals compared to small hospitals (p<.001). African Americans were 8.4 percentage points more likely (p<.001) and Whites were 9.2 percentage points more likely (p<.001) to be assessed at large hospitals compared to small hospitals. Hypothesis 3 predicted that racial differences would be greater at small hospitals. Contrary to this hypothesis, African Americans were 1.9 percentage points more likely than Whites to be assessed at large hospitals (p<.001), but this relationship was not significant at small hospitals.

Discussion

Post-stroke assessments are a critical component of care for patients, because they are used to identify residual disability and develop an appropriate rehabilitation plan. Most patients in this study (92.4%) were assessed, but the likelihood of receiving an assessment differed significantly by race. Hypothesis 1 predicted that Whites would be more likely than African Americans to be assessed. Contrary to this hypothesis, results from the logit models indicated that Whites were less likely to be assessed than African Americans. This relationship was consistent across all hospital characteristics, save for three exceptions (non-urban, small hospitals, and for-profit hospitals). These findings indicate that, overall,

Whites may be less likely than African Americans to receive a standard of care consistent with recommended guidelines for assessment. Because of the greater incidence and severity of stroke among African Americans in North Carolina (Huston, 2008), providers in acute care settings may be more sensitive to the need to assess them for disability. Additional research is needed to understand why Whites are less likely to be assessed and if the lower likelihood of receiving an assessment leads to more adverse health outcomes. An important fact to consider is that, while the differences between African Americans and Whites were statistically significant, they were relatively small (<3 percentage points) from a practical perspective.

Much larger differences were observed between hospitals. Hypothesis 2 indicated that patients would have a higher probability of being assessed at urban, not-for-profit, teaching, and large hospitals. Contrary to this hypothesis, urban location did not influence likelihood of being assessed. However, statistically significant differences were observed for the other hospital characteristics. As predicted in hypothesis 2, patients were more likely to be assessed at not-for-profit hospitals compared to for-profit hospitals (by 7.4 percentage points). For-profit hospitals may have had less incentive than not-for-profit hospitals to assess patients, particularly if the hospitals were not associated with postacute rehabilitation facilities that required patient assessments prior to admission. For-profits' lower likelihood of assessing patients was particularly problematic for African Americans. African Americans at for-profit hospitals had the lowest probability of being assessed (82.2%). African Americans were 12.4 percentage points less likely to be assessed at for-profit hospitals than at not-for-profit hospitals. By comparison, Whites were only 5.6 percentage points less likely to be assessed at for-profit hospitals. These findings indicate that, not only are for-profit hospitals inconsistent at assessing patients overall (only 85.4% of patients were assessed), but they are particularly derelict with respect to assessing African Americans. Additional research is

needed to better understand the relationship between profit status and likelihood of being assessed, particularly among African Americans.

Also consistent with hypothesis 2 was the finding that stroke patients were more likely to be assessed at large hospitals compared to small hospitals. Small hospitals may be less likely than large hospitals to have an infrastructure that supports clinical and administrative processes for managing stroke, including adhering to recommended guidelines. Furthermore, because small hospitals treat a lower volume of stroke patients than large hospitals, the small hospitals in this sample may have been less adept at providing acute stroke care, including assessments. Previous research has supported the idea that patients have better health outcomes when they receive care at hospitals with higher stroke volume (Saposnik et al., 2007). Contrary to hypothesis 2, teaching hospitals were 6.9 percentage points less likely to assess patients than non-teaching hospitals. This finding was unexpected given that previous studies have shown patients have more favorable outcomes at teaching hospitals (Gillum & Johnston, 2001; Kupersmith, 2005). The advantage that previous research has attributed to teaching hospitals may have been due to the use of advanced treatment procedures and technology and not to processes of care such as rehabilitation assessments.

There were several limitations to this study. First, this study reflected assessment at a small sample of North Carolina hospitals. Hospitals that participated in the NCCSR may have differed significantly from other hospitals and therefore, may not be generalizable to all hospitals in the state. Second, some important hospital characteristics were not available in the data set. For example, the amount of hospital resources devoted to stroke care and the hospital's level of commitment to implement stroke care guidelines were not measured but could have impacted whether patients were assessed. Third, small sample sizes for some of the hospitals may have affected the results. While some hospitals reported data for hundreds of stroke patients, other hospitals reported data for less than 10 patients.

Additionally, the sample size of African Americans at for-profit hospitals was relatively small (2.4%). Fourth, this study lacked a direct measure of stroke severity such as the National Institutes of Health Stroke Scale. Consistent with other stroke research (Ayala et al., 2001), this study substituted length of stay as a proxy measure for stroke severity. Because African Americans tend to have greater stroke severity than Whites, not controlling fully for stroke severity could have biased results such that African Americans appeared more likely to be assessed. However, the magnitude of any such bias would likely be small, since previous studies have shown a strong positive correlation between stroke severity and length of stay (Appelros, 2007; Chang et al., 2002). Despite these limitations, this study makes a significant contribution to the stroke care literature. Only a limited number of studies have focused on rehabilitation utilization, and this is the first study to examine the effect of race and hospital characteristics on the probability of receiving an assessment to determine level of post-stroke disability.

In conclusion, although stroke care guidelines recommend that all stroke patients are assessed for rehabilitation, adherence to those recommendations is not standard practice at all hospitals. Instead, some stroke patients may be "slipping through the cracks" and not receiving rehabilitation assessments. The findings from this study have significant public health implications. First, patients who are not assessed may not receive a comprehensive rehabilitation plan or consults with rehabilitation therapists during the critical period immediately following stroke. Inability to access appropriate rehabilitation therapies in the initial period after a stroke may result in significant long-term health effects, since the patient's likelihood of a full recovery may be compromised. Second, patients who have not been assessed may be precluded from being discharged to certain postacute rehabilitation locations (e.g., IRF) that require patient assessments as part of their admissions criteria. Third, some insurance companies may refuse to pay for rehabilitation services unless an official assessment was done during acute hospitalization to establish need for those

services. Additional research is needed to better understand how providers in acute hospital settings decide which patients receive assessments, why some patients are not assessed, and why likelihood of assessment differs based on race and hospital characteristics.

Future research should also explore potential differences in the timing of assessments (i.e., the number of hours after initial symptoms have been controlled before assessments are completed), the type of assessments that patients receive (e.g., physical therapy, occupational therapy, speech-language pathology), and who conducts the assessments (e.g., physicians versus therapists) as well as what implications these factors have for patient outcomes. Whenever possible, future studies should include patients of different racial and ethnic groups. North Carolina, for example, has a high number of American Indians and a growing number of people of Hispanic origin, but little work has been done with these populations. Lastly, this work suggests a need for stroke care protocols to be implemented within hospitals to ensure that all patients regardless of race receive a standard of care consistent with current recommended guidelines (Schwamm et al., 2010). Previous research has shown that participation in programs such as Get With The Guidelines increases adherence to recommended guidelines for stroke care (LaBresh, Reeves, Frankel, Albright, & Schwamm, 2009).

CHAPTER 4

RACIAL DIFFERENCES IN DISCHARGE DESTINATION AMONG STROKE PATIENTS IN NORTH CAROLINA

Abstract

Background and purpose: Following acute hospitalization for stroke, patients are typically discharged to home, inpatient rehabilitation facilities (IRF), or skilled nursing facilities (SNF). This study examined the relationship between race and discharge destination among stroke patients in North Carolina.

Methods: The sample included 8,770 African American and White stroke patients. Multinomial logit models were used to test the likelihood of being discharged to IRF or SNF compared to home. Predicted probabilities were calculated to determine the probability of being discharged to each location given race and hospital characteristics.

Results: Age, length of stay, hypertension, and diabetes were associated with being discharged to IRF or SNF rather than home. Female sex, Medicare, prior stroke, and atrial fibrillation were also associated with being discharged to SNF. Whites had a higher probability of being discharged home ($p<.001$). African Americans were more likely to be discharged to IRF ($p=.014$) or SNF ($p<.001$). For-profit and teaching hospitals were more likely to discharge patients home. Discharge to IRF was associated with availability of services, but discharge to SNF was not associated with any measures of availability.

Conclusion: Following acute hospitalization for stroke, Whites are more likely to go home and African Americans are more likely to be admitted to a facility. Access to care is an important predictor of discharge to IRF but not SNF. Additional research is needed to

determine if racial variations in discharge destination are based on clinical appropriateness or other factors such as access to services.

Introduction

Stroke is a major health care issue in the United States and is one of the most common causes of long-term disability. Rehabilitation helps stroke patients optimize neurological recovery, improve functional status, implement secondary stroke prevention measures, manage comorbidities, and promote emotional health (Schwamm et al., 2005; Shah, 2006). While early and aggressive rehabilitation during hospitalization is critical (Bates et al., 2005), rehabilitation after discharge is also important in the pathway to recovery. Following acute hospitalization for stroke, patients are typically discharged to one of three locations. Medically stable patients with minimal deficits and adequate social support can be discharged home and may also receive follow-up care such as outpatient therapy or home health services. Patients with at least two functional disabilities who are well enough to participate in intense therapy may be discharged to inpatient rehabilitation facilities (IRF). Patients with severe disabilities who are not well enough to participate in therapy may be discharged to skilled nursing facilities (SNF). Significant variations exist with respect to the type and intensity of services provided in each rehabilitation setting (Duncan et al., 2005). For example, stroke patients at IRF might receive three hours of daily therapy from a team of health care providers while patients at SNF might receive just a few hours of therapy per week.

Within the stroke care literature, researchers have documented a pattern of racial inequality across the stroke care continuum, including incidence and outcomes of stroke, quality of acute care, and stroke rehabilitation processes and outcomes (Stansbury et al., 2005). Considerably less research has investigated potential variations in use of postacute rehabilitation, and the evidence that does exist has not been conclusive. For example,

Gregory and colleagues (2006, 2009) did not find an independent effect of race on discharge to IRF compared to home. However, Onukwugha and Mullins (2007) found that being African American was independently associated with in-hospital mortality and discharge to a medical care facility rather than home. These studies did not specifically consider discharge to the three most common destinations (home, IRF, SNF) and did not control for hospital characteristics that may affect discharge destination.

Given the dearth of evidence examining potential variations in discharge destinations following stroke, additional research is needed in this area of stroke care. Accordingly, this study expanded upon previous research by examining the relationship between race and discharge to home, IRF, or SNF. In addition to patient-level variables, important hospital characteristics (i.e., urban location, profit status, teaching status, size) were also included in the analyses. Three hypotheses guided this study: 1) Whites are more likely to be discharged home (i.e., because they tend to have less severe strokes than African Americans and therefore, may be less likely to need postacute rehabilitative care); 2) African Americans are more likely to be discharged to IRF (i.e., because they may be more likely to require the intense therapy that IRF offer); and 3) Whites are more likely to be discharge to SNF (i.e., since previous research outside the stroke care literature has shown this to be the case; Friedman et al., 2005). This research is one of only a few studies to investigate racial variations in discharge destinations but differs from other studies by including three discharge destinations plus multiple hospital-level characteristics in the analysis.

Methods

Data were obtained from the North Carolina Collaborative Stroke Registry (NCCSR) for years 2005 through 2008. The NCCSR, which is a part of the CDC-funded Paul Coverdell National Acute Stroke Registry, uses a centralized, web-based registry to collect

data on the treatment of stroke patients. For six months out of each year, hospitals input data on all patients who present to their emergency departments with symptoms of stroke. The data collected includes patient socio-demographic characteristics, relevant clinical indicators and medical history, treatment procedures and inpatient services, and discharge status. All North Carolina nonfederal hospitals with a dedicated emergency department are eligible to participate in the registry. A more comprehensive description of the goals and design of the NCCSR is available elsewhere (George et al., 2009).

This study used data collected from 35 hospitals and included all patients who received a diagnosis of stroke, were at least 45 years old, and discharged to home, IRF, or SNF. Because of small sample sizes that limited analyses, patients were excluded if their race was classified as American Indian, Alaskan Native, Asian, Pacific Islander, or multiracial (n=285). In addition, four patients were excluded due to missing data. The final sample included 8,770 patients.

Measures

The dependent variable measured discharge from the hospital to home (including routine discharge and discharge to home under the care of an organized home health service organization), IRF (including hospital-based inpatient rehabilitation units and other IRF), or SNF. Control variables included patient socio-demographic characteristics, patient clinical indicators, hospital characteristics, discharge destination availability variables, and year dummies. Race was coded as White or African American. Age was measured continuously in years. Sex was coded as a dummy variable for female or male. Insurance status was measured using two dummy variables to indicate if patients had Medicare and any other type of insurance. Length of stay was measured continuously in days and was calculated using admission and discharge dates. Dummy variables were used to indicate a history of eight comorbidities: hypertension, diabetes, prior stroke, heart disease (i.e.,

myocardial infarction or coronary artery disease), atrial fibrillation, TIA, peripheral arterial disease, or carotid stenosis. Stroke type was classified as either ischemic (ICD-9 codes 433-434.91, 436) or hemorrhagic (codes 430-432). Hospital characteristics included urban location (urban or non-urban), profit status (for-profit or not-for-profit), teaching status (teaching or non-teaching) and size (large if ≥250 beds or small if <250 beds). Urban location was classified using the 2003 Urban Influence Codes, which categorizes counties by size, degree of urbanization, and proximity to metro areas (USDA, 2003). The remaining hospital characteristics were obtained from the American Hospital Association Guide (AHA, 2005). Discharge destination availability variables were obtained from the Area Resource File (ARF, 2006) and were measured continuously as the number of stand-alone and hospital-affiliated home health agencies (important for patients being discharged home), hospital-based and other IRF, and SNF in the county in which the hospital was located. Year dummies for 2006, 2007, and 2008 were included to control for potential trends in discharge destination over time.

Statistical Analyses

Stata version 11 software was used for all of the analyses (StataCorp, 2009). Descriptive statistics about the sample were calculated and differences by race were determined using *t*-tests and X^2 analyses. Multinomial logistic regression was used to analyze the data with home as the reference category. The model, which included all of the aforementioned measures, accounted for clustering within hospitals and estimated robust standard errors. A second model that also included interaction terms for race and hospital characteristics was run, but the interactions were not significant. Therefore, only the initial model without interaction terms is presented in this paper. This model was used to predict the probability of being discharged from acute hospitalization to home, IRF, or SNF.

Results

Table 4.1 presents descriptive statistics for the study sample. More than half the sample was discharged home (54.8%), 24.9% was discharged to IRF, and 20.3% was discharged to SNF. The sample was 72.2% White and 27.8% African American, and slightly more than half of the sample was female (50.8%). Significant racial differences existed with respect to patient socio-demographic and clinical characteristics. The average age of the sample was 69.7 years, but African Americans were younger than Whites by a mean of 6.8 years. Whites were more likely to have Medicare and more likely to have another form of insurance instead of or in addition to Medicare. African Americans were more likely to be uninsured. African Americans had longer hospitals stays by a mean of 1.4 days. African Americans were more likely to have hypertension, diabetes, and a prior stroke, while Whites were more likely to have heart disease, atrial fibrillation, TIA, and carotid stenosis. African Americans were more likely to receive a diagnosis of hemorrhagic stroke. While African Americans were more likely to receive care at hospitals that were urban, teaching, and large, Whites were more likely to receive care at for-profit hospitals.

A multinomial logit model was used to test the hypotheses that Whites would be more likely to be discharged home and to SNF, while African Americans would be more likely to be discharged to IRF. Results from the multinomial logit model show that, compared to African Americans, Whites were significantly more likely to be discharged home than to IRF or SNF (Table 4.2). Older age, longer length of stay, and a medical history of hypertension or diabetes were positively associated with discharge to IRF or SNF rather than home. In addition, female sex, Medicare insurance, and a medical history of prior stroke or atrial fibrillation were also positively associated with discharge to SNF. For-profit and teaching hospitals were more likely than not-for-profit and non-teaching hospitals to discharge patients home rather than IRF. Urban and teaching hospitals were more likely than non-urban and non-teaching hospitals to discharge patients home rather than SNF.

Table 4.1 Descriptive Statistics for Stroke Patients by Race, %

	African American (n = 2,441)	White (n = 6,329)	Total (n = 8,770)
Patient-level characteristics			
Dependent Variable			
Home***	50.8	56.4	54.8
IRF***	29.3	23.2	24.9
SNF	19.9	20.4	20.3
Age***			
Mean (SD), years	64.8 (12.4)	71.6 (12.4)	69.7 (12.8)
Sex*			
Female	52.6	50.1	50.8
Male	47.4	49.9	49.2
Insurance			
Medicare***	52.6	69.7	64.9
Other insurance**	58.2	61.4	60.5
No insurance***	15.1	5.9	8.5
Length of stay***			
Mean (SD), days	7.2 (8.3)	5.8 (7.0)	6.2 (7.4)
Comorbidities			
Hypertension***	83.0	71.9	75.0
Diabetes***	39.5	29.2	32.1
Prior Stroke***	32.5	26.6	28.3
Heart disease***	18.8	28.4	25.8
Atrial fibrillation***	8.1	15.4	13.3
TIA***	5.8	10.4	9.1
PAD	3.4	3.9	3.7
Carotid stenosis***	1.7	4.3	3.6
Stroke type***			
Hemorrhagic	16.5	12.9	13.9
Ischemic	83.5	87.1	86.1
Hospital-level characteristics			
Urban***	80.7	76.1	77.4
For-profit***	2.3	7.0	5.7
Teaching***	27.9	15.7	19.1
Large***	82.1	76.4	78.0

Note: Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05; PAD = peripheral arterial disease

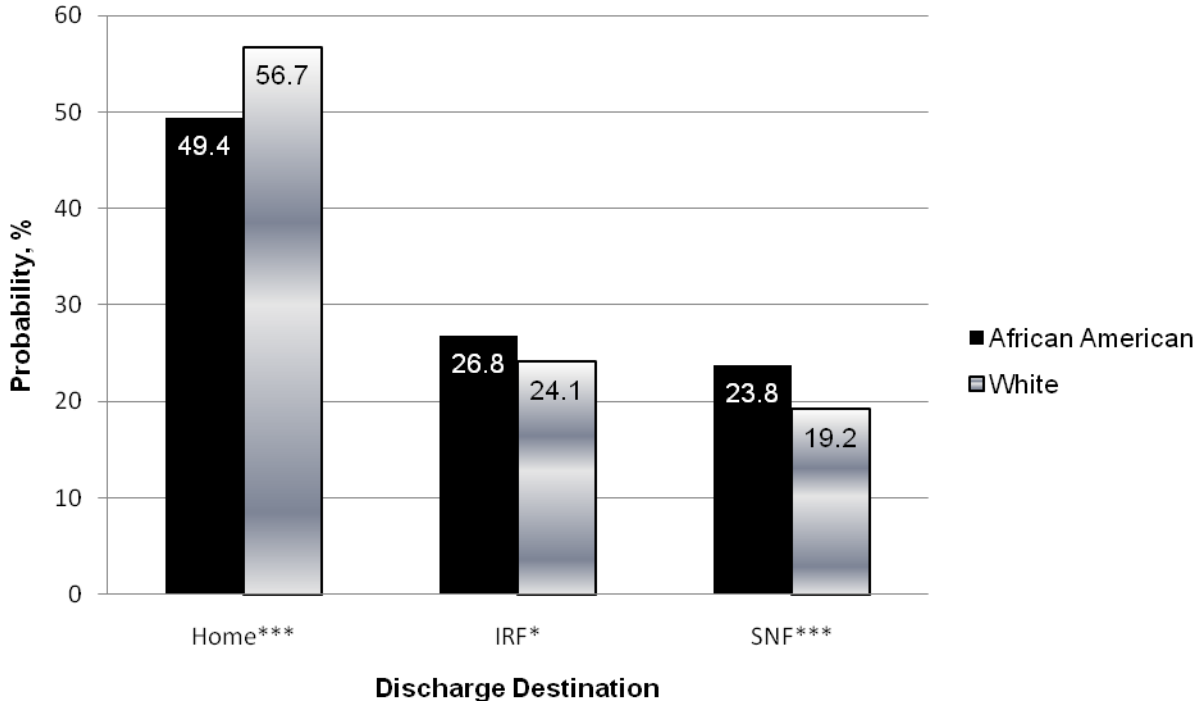
Discharge to IRF rather than home was positively associated with the number of home health agencies and other IRF in the county and negatively associated with the number of SNF. Discharge to SNF was not significantly associated with the availability of any discharge destination.

Table 4.2 Results for Multinomial Logit Models (n=8,770)

Variable	IRF	SNF
Socio-demographic characteristics		
White	-.307 (.076)***	-.496 (.092)***
Age	.024 (.004)***	.088 (.004)***
Female	.003 (.066)	.328 (.081)***
Medicare	-.055 (.093)	.261 (.103)**
Other insurance	-.083 (.057)	-.001 (.093)
Clinical indicators		
Length of stay	.183 (.029)***	.254 (.029)***
Comorbidities		
Hypertension	.272 (.060)***	.185 (.083)*
Diabetes	.176 (.063)**	.226 (.073)**
Prior stroke	.033 (.060)	.568 (.063)***
Heart disease	-.117 (.078)	-.105 (.089)
Atrial fibrillation	.009 (.076)	.198 (.071)**
TIA	-.056 (.096)	-.098 (.094)
Peripheral arterial disease	-.116 (.160)	.211 (.182)
Carotid stenosis	-.021 (.118)	-.199 (.195)
Ischemic stroke	.082 (.127)	-.078 (.152)
Hospital-level characteristics		
Urban	-.151 (.178)	-.268 (.108)*
For-profit	-.336 (.167)*	.047 (.160)
Teaching	-.361 (.135)**	-.535 (.171)**
Large	.257 (.215)	-.199 (.121)
Discharge destination availability variables		
Hospitals with home health	-.205 (.201)	.114 (.089)
Home health agencies	.127 (.055)*	-.025 (.049)
Hospitals with rehabilitation	.369 (.338)	-.132 (.137)
IRF	.921 (.253)***	.203 (.172)
SNF	-.051 (.016)***	-.009 (.021)
Year control variables		
2006	-.043 (.119)	-.294 (.134)*
2007	.020 (.154)	-.226 (.153)
2008	.296 (.190)	-.387 (.153)*

Note: Robust standard errors are reported in parentheses. Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05

Figure 4.1 Predicted Probabilities of Discharge Destination by Race



Note: Significance levels are reported as follows: ***p<.001, **p<.01, *p<.05

Predicted probabilities were calculated to further investigate the relationship between race and discharge destination as well as the relationship between hospital characteristics and discharge destination. Figure 4.1 depicts racial differences in the predicted probabilities of discharge to home, IRF, or SNF. Whites were 7.3 percentage points more likely than African Americans to be discharged home (56.7% vs. 49.4%; p<.001). African Americans were 2.7 percentage points more likely to be discharged to IRF (26.8% vs. 24.1%; p=.014) and 4.6 percentage points more likely to be discharged to SNF (23.8% vs. 19.2%; p<.001). Table 4.3 shows racial and hospital differences in the predicted probability of being discharged home. Whites were more likely than African Americans to be discharged home regardless of hospital characteristics (p<.001). No significant differences in discharge home existed based on urban location (55.8% urban vs. 52.0% non-urban; p=.054) or size (54.7% large vs. 56.2% small; p=.508). However, for-profit hospitals were 3.4 percentage points

Table 4.3 Predicted Probabilities of Being Discharged Home by Race and Hospital Characteristics, %

	Total	African American	White
Urban	55.8 (54.5-57.1)	50.4 (48.4-52.5)	57.6 (56.0-59.3)
Non-urban	52.0 (49.1-55.0)	46.6 (42.9-50.3)	54.0 (51.0-56.9)
For-profit	58.0 (55.4-60.6)	52.6 (48.8-56.5)	59.9 (57.5-62.3)
Not-for-profit	54.6 (53.5-55.7)	49.2 (47.3-51.2)	56.5 (55.1-57.9)
Teaching	61.3 (59.2-63.4)	56.2 (52.7-59.7)	63.1 (61.2-65.0)
Non-teaching	53.4 (52.0-54.7)	48.0 (46.0-49.9)	55.3 (53.5-57.0)
Large	54.7 (53.2-56.2)	49.3 (47.3-51.4)	56.6 (54.7-58.4)
Small	56.2 (52.8-59.5)	50.7 (46.7-54.8)	58.1 (54.8-61.4)

Note: 95% confidence intervals are reported in parentheses.

more likely than not-for-profit hospitals to discharge patients home (58.0% vs. 54.6%; p=.044) and teaching hospitals were 7.9 percentage points more likely than non-teaching hospitals to discharge patients home (61.3% vs. 53.4%; p<.001). Predicted probabilities were also calculated to investigate the relationship between race, hospital characteristics, and discharge to IRF and SNF (results not shown). Only one finding was significant: non-teaching hospitals were 4.5 percentage points more likely than teaching hospitals to discharge patients to SNF (21.0% vs. 16.5%; p=.047).

Discussion

Following acute hospitalization for stroke, most patients are discharged to home, IRF, or SNF. This study examined the relationship between race and discharge to these three destinations. This research added to the stroke rehabilitation literature by examining three common discharge destinations and by controlling for multiple hospital-level characteristics in the analysis. Results from the multinomial logit model showed that discharge to IRF rather than home was associated with patients who were African American,

older, had longer lengths of stay at the hospital, had a medical history of hypertension or diabetes, and were discharged from for-profit or non-teaching hospitals. Discharge to SNF rather than home was associated with patients who were African American, older, female, insured through Medicare, had longer lengths of stay, had a medical history of hypertension, diabetes, prior stroke, or atrial fibrillation, and were discharge from non-urban and non-teaching hospitals.

Results from this study supported hypothesis 1, which predicted that Whites would be more likely than African Americans to be discharged home. While most patients prefer to return home after a hospital stay, discharge home is not always the most clinically appropriate option given a patient's functional disabilities and medical needs. Given that African Americans tend to have more severe strokes than Whites, it is reasonable to believe that they would be more likely to need the intensity of care offered at postacute rehabilitation facilities. Although length of stay was used as a proxy measure to control for stroke severity, this study lacked a direct measure of stroke severity such as the National Institutes of Health Stroke Scale. Therefore, it is not clear if the racial differences in probability of discharge to home versus a facility were due in part to differences in stroke severity. Additional research is needed to determine if racial differences in the likelihood of being discharged to home versus an institution are clinically appropriate.

The findings from this study provided mixed support for the hypotheses related to discharge to postacute rehabilitation facilities. The results supported hypothesis 2, which predicted that African Americans would be more likely than Whites to be discharged to IRF. However, the results did not support hypothesis 3, which predicted that Whites would be more likely to be discharged to SNF. Instead, results indicated that African Americans were more likely than Whites to be discharged to SNF. This finding was unexpected given that previous studies have found that African Americans were less likely than Whites to be discharged to SNF (Buntin, 2007; Friedman et al., 2005; Mason et al., 2009). African

Americans' higher probability of discharge to SNF could have significant implications for their rehabilitation outcomes. Specifically, African Americans are more likely than Whites to receive care at nursing facilities that are understaffed, have poor performance, and are financially vulnerable (Mor, Zinn, Angelelli, Teno, & Miller, 2004; Smith, Feng, Fennell, Zin, & Mor, 2007). Furthermore, African Americans discharged to SNF have a higher risk than Whites of returning to the hospital within 30 days of discharge (Kind, Smith, Liou, Pandhi, Frytak, & Finch, 2010). If African Americans are more likely to be discharged to SNF, particularly when it is not clinically necessary, then the magnitude of racial disparities in quality of postacute care and bounce backs to the hospital could be exacerbated.

This study found that discharge destination differed somewhat by hospital characteristics. For example, the predicted probabilities indicated that for-profit and teaching hospitals were more likely than not-for-profit and non-teaching hospitals to discharge patients home. The mechanisms driving this finding are unclear. One possibility is that some types of hospitals have a different case mix than others. For example, if stroke patients at teaching hospitals have less residual disability than patients at non-teaching hospitals, it would make sense that teaching hospitals would be more likely to discharge patients home. Another possibility is that there are other factors (e.g., hospital commitment to equitable stroke care, quality of discharge planning, etc.) associated with the hospital characteristics that are driving the differences in discharge destination. Additional research is needed to determine how hospital characteristics impact differences in discharge destination.

Results from this study indicate that discharge destination may be influenced by access-related factors. For example, discharge to IRF versus home was positively associated with the number of home health agencies and IRF in the county but negatively associated with the number of SNF. This result could mean that patients who are good candidates for IRF are discharged to IRF – but only in counties that have a higher number of

IRF. In counties that have more SNF, patients who are eligible for IRF may instead be discharged to SNF. This finding has important implications because IRF-eligible patients admitted instead to SNF might not receive a level and intensity of rehabilitative care that is clinically appropriate. Discharge to SNF was not associated with availability measures, which suggests that there may be sufficient access to SNF for patients who are eligible. Future research should investigate if there are sufficient IRF to meet the needs of stroke patients in North Carolina and if discharge to SNF rather than IRF for IRF-eligible patients has significant long-term health outcomes.

The findings from this study should be considered in light of several limitations. First, because hospitals that participated in the NCCSR may have differed significantly from other hospitals, the results may not be generalizable to all hospitals in the state. Second, this study lacked some patient- and hospital-level variables that may be important predictors of discharge destination. For example, patient preferences, proximity to postacute rehabilitation facilities, amount of family support, and level of post-stroke disability can all influence discharge destinations and may have varied by race. Additionally, hospital characteristics such as affiliation with a postacute rehabilitation facility and quality of discharge planning were not available for the analyses. Third, this study lacked a direct measure of stroke severity and instead used length of stay as a proxy measure for stroke severity. While length of stay has been shown to be highly correlated with stroke severity (Appelros, 2007; Chang et al., 2002), it may not have completely controlled for differences in stroke severity. Lastly, the other insurance category used in this study does not specify whether patients had Medicaid or private insurance. Lack of specification for this variable may explain why the other insurance variable was not significant in the multinomial logit models.

In conclusion, this study found that Whites were more likely than African Americans to be discharged home following acute hospitalization from stroke. The likelihood of being

discharged to home rather than a facility varied by hospital characteristics and availability of discharge destinations. This study is important for several reasons. First, it adds to the limited amount of research in this area and contributes a new perspective by incorporating multiple hospital-level characteristics in the analyses. Second, this study has important implications regarding potential disparities with respect to the type, quality, and availability of postacute rehabilitation care that stroke patients receive. Third, this study raises important questions about potential racial differences in the discharge planning process and potential differences in long-term health outcomes due to differences in initial discharge destination. Future research should investigate whether racial differences in discharge destination are clinically appropriate, driven by differences in patient preferences or availability of services, or the result of biases in the discharge planning process.

CHAPTER 5

TRANSITIONS OF CARE FOR STROKE PATIENTS: A QUALITATIVE STUDY OF DISCHARGE PLANNERS IN NORTH CAROLINA

Abstract

Background and purpose: Hospital discharge planners play a critical role in facilitating care transitions within and across settings. The purpose of this study was to identify and describe factors that impacts two measures of stroke rehabilitation utilization that both impact transitional care – assessment for disability during acute hospitalization for stroke and discharge destination.

Methods: A stratified sampling technique was used to select hospitals that varied by urban location, teaching status, and profit status. Semi-structured telephone interviews were conducted with discharge planners at nine hospitals in North Carolina. Interviews were transcribed verbatim, coded, and analyzed using a grounded theory approach.

Results: Discharge planners reported that standard orders for stroke care, the need to navigate admissions criteria to ensure patients received postacute rehabilitation services, and patient clinical conditions during hospitalization all contributed to whether patients were assessed. The factors that influenced discharge destination included patient clinical indicators (e.g., level of functioning or disability), patient preferences, patient support systems, financial considerations (e.g., insurance coverage), availability of services in the patient's geographic area, and whether hospitals were affiliated with postacute rehabilitation facilities. Discharge planners did not identify any factors that contribute to racial differences in assessment or discharge destination.

Conclusion: Numerous factors influence patient assessments and discharge destinations. Hospitals have mechanisms in place to ensure patients are assessed. Discharge destination is influenced by clinical-, patient-, and access-related factors. Additional research is needed to better understand why racial differences exist in this area of care.

Introduction

Stroke is a leading public health problem that affects approximately 795,000 Americans each year (Lloyd-Jones et al., 2009). Stroke survivors are often left with physical, cognitive, and emotional disabilities that require rehabilitative care during and after discharge from the hospital (CDC, 2008). Stroke patients experience multiple care transitions within and across settings, including hospitals, postacute rehabilitation facilities (e.g., inpatient rehabilitation, nursing, and long-term care facilities), and locations within the community (e.g., patient's home). Consequently, transitional care, the "set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location," is particularly important for stroke patients (Coleman & Boult, 2003). Effective transitional care can help patients avoid adverse clinical outcomes, hospital readmissions, medical errors, inappropriate use of services, and dissatisfaction with quality of care (Coleman & Boult, 2003; Kripalani, Jackson, Schnipper, & Coleman, 2007).

Previous research by the author has investigated racial differences in two measures of stroke rehabilitation utilization that both impact transitional care – assessment for disability during acute hospitalization for stroke and discharge destination following acute hospitalization for stroke. Post-stroke assessments speak to transitions of care within acute care settings. Comprehensive stroke care guidelines recommend that all stroke patients are assessed to identify disability so an appropriate rehabilitation plan can be developed (Reeves et al., 2010; Schwamm et al., 2005). Patients should transition towards

rehabilitative care once life-threatening conditions have been controlled following a stroke (Bates et al., 2005). Early rehabilitation increases the likelihood that patients will regain functional ability. Despite the importance of being assessed, a previous study showed that not all patients received an assessment (see Chapter 3). Furthermore, the likelihood of being assessed varied by race and hospital characteristics. For example, while African Americans were more likely than Whites to be assessed overall, African Americans at for-profit hospitals were the least likely group to be assessed. These findings indicated that hospital-level factors may influence whether patients are assessed and these factors may have differential effects depending on patient race. Findings from this study highlighted the need to better understand how providers at different hospitals decide which patients get assessed and why some patients get assessed and not others.

Discharge destinations are another measure of stroke rehabilitation utilization, and they speak to transitions of care across health care settings. Typically, stroke patients are discharged to home, inpatient rehabilitation facilities (IRF), or skilled nursing facilities (SNF), but other discharge destinations are also plausible (e.g., hospice, long-term care facilities, etc.). Discharge destinations determine the type, amount, and intensity of rehabilitative care that patients receive. For example, patients at IRF receive up to three hours of daily therapy from a team of providers, while patients at SNF may receive just a few hours of therapy each week. A previous study of African American and White stroke patients found racial differences in discharge destinations (see Chapter 4). Specifically, Whites were more likely to be discharged home, while African Americans were more likely to be discharged to IRF and SNF. The findings from this study did not provide evidence as to what specific factors might have contributed to racial differences in discharge destination.

This study builds upon the author's previous work by using qualitative interviews with hospital discharge planners to further investigate some of the questions that arose during the initial studies. Discharge planners were selected because they play a critical role in

facilitating care transitions, particularly as stroke patients are discharged from acute hospitalization to another location. In addition, many discharge planners are familiar with the acute care that patients receive, including whether patients are assessed. The purpose of this study was to identify the factors that influence whether stroke patients are assessed, identify the factors that influence how discharge decisions are made, and identify factors that may contribute to racial differences in these two measures of rehabilitation utilization.

Methods

Procedure

A stratified sampling technique was used to select hospitals in North Carolina that varied by urban location, teaching status, and profit status. This technique facilitated the recruitment of participants from various types of hospitals, an important consideration since trends in assessment and discharge decision-making may vary based on hospital characteristics. Given the types of hospitals located in North Carolina (e.g., all teaching hospitals are located in urban areas), hospitals were separated into the following five categories: 1) teaching hospitals; 2) urban, not-for-profit hospitals; 3) non-urban, not-for-profit hospitals; 4) rural, not-for-profit hospitals; and 5) for-profit hospitals. Two hospitals from each list were selected. The PI called the main line at each hospital and asked to speak to someone who participated in discharge planning for stroke patients and was knowledgeable about stroke care in the hospital. Once an appropriate person to interview was identified, the PI explained the purpose of the study, offered to send a fact sheet about the study, and scheduled a time to conduct the interview. If an appropriate person to interview could not be reached after ten attempts or the person declined to participate, a hospital from the same category was selected in its place. Recruitment continued until data saturation was reached. Interviews were conducted via telephone and audio-taped. Each interview lasted approximately 30 to 45 minutes and was guided by a semi-structured

interview protocol that explored the process of stroke care in the hospital from admission to discharge (Appendix). The interviews included specific questions about the percentage of patients who are assessed, why some patients might not be assessed, and how discharge decisions are made. Participants were also asked to identify factors that might contribute to racial differences in whether patients are assessed and how discharge decisions are made.

Sample

Study participants were recruited from nine hospitals, including two teaching hospitals, one urban not-for-profit hospital, one non-urban not-for-profit hospital, three rural hospitals, and two for-profit hospitals. All of the participants were female and had backgrounds in nursing. While the participants' titles and roles within the hospital varied (e.g., case manager, resource manager, clinical care coordinator, discharge planner), they all participated in discharge planning for stroke patients and were familiar with other aspects of stroke care at their hospitals. At some hospitals, all discharge planning was done by a single person, and at other hospitals, multiple providers (e.g., social workers, nurses, etc.) participated in the discharge planning process.

Data Analysis

Interview transcripts were transcribed verbatim and entered into Atlas.ti, a software program that facilitates qualitative data analysis. A grounded theory approach was used to analyze and interpret the data. Grounded theory is used to systematically uncover concepts, themes, and relationships between variables (Strauss & Corbin, 1990). In this study, grounded theory was used to investigate the themes related to stroke rehabilitation utilization (i.e., post-stroke assessments and discharge destinations as well as racial differences in these two areas of care) as well as discover and explain the factors that influenced these themes. Each transcript was read to gain a general understanding of the

data. This process involved taking notes and writing memos to highlight interesting quotes and particularly important themes in the data. Open coding was used to generate a coding guide to identify and categorize all the quotes related to assessing patients and discharge planning. For example, codes were used to identify quotes related to "discharge to SNF," "Medicare," and "challenges." The codes were then reviewed to better understand their relationships with each other and develop broader concepts, or factors, that more fully explained the data. For instance, since the three aforementioned codes overlapped in the transcripts, the quotes related to those codes were used to identify financial considerations as a factor that influences discharge destination.

Results

This study investigated three themes as well as the factors that influence these themes. The first theme was post-stroke assessments, and three factors were identified that influence whether stroke patients are assessed (standard orders, admissions criteria, patient conditions). The second theme was discharge destinations, and six factors were identified that influence how discharge decisions are made (clinical indicators, patient preferences, patient support systems, financial considerations, availability of services, hospital affiliations). The third theme was related to racial differences in assessments and discharge destinations. No factors were identified but discharge planners' thoughts regarding racial differences in assessment and discharge decision-making are also presented in this paper. The themes, factors, and explanations of the factors are presented in Table 5.1. Each of the themes and factors are discussed in more detail below.

Post-stroke Assessments

The first theme in this study was related to post-stroke assessments. Three factors influenced whether stroke patients were assessed: standard orders for stroke were used to

Table 5.1 Factors that Influence Post-stroke Assessments and Discharge Decision-Making

Themes	Factors	Explanation
#1. Post-stroke assessments	Standard orders	standard orders were used by hospitals to prompt therapists and physicians to assess all stroke patients
	Admissions criteria	because some postacute rehabilitation facilities required patient assessments prior to admission, discharge planners made sure patients were assessed
	Patient conditions	when patients were in poor condition, their assessments were postponed for later during the hospital visit
#2. Discharge destinations	Clinical indicators	therapists and physicians made discharge recommendations based on clinical indicators (e.g., level of functioning and disability)
	Patient preferences	patients choose whether they want to go home or to a facility; discharge planners sometimes sway patient preferences to align with clinical recommendations
	Patient support systems	adequate support is necessary for a safe discharge home and may also impact admission to IRF
	Financial considerations	inadequate financial resources and insurance coverage negatively impact ability to access services
	Availability of services	some discharge options may not be available in certain areas
	Hospital affiliations with postacute facilities	if patients were good candidates for multiple types of facilities (e.g., IRF and SNF), some hospitals recommended facilities with which they were affiliated
#3. Racial differences	No factors identified	discharge planners were unable to identify any factors that contribute to racial differences in assessment or discharge destination

ensure all patients were assessed, admissions criteria from postacute rehabilitation facilities served as a “back-up” for patients who had not been assessed, and patient conditions could sometimes preclude patients from being assessed – at least temporarily. Standard orders for stroke were the primary means hospitals used to ensure that all stroke patients were assessed for disability. The only hospitals that did not have standard orders for stroke were a for-profit hospital that was currently “starting to put together a stroke protocol” and two rural hospitals that transferred more stroke patients to other hospitals than they admitted into their own hospitals. Most standard orders required that patients were assessed within 24 hours of arrival. At some hospitals, therapists were automatically notified when stroke patients were admitted. At other hospitals, the standard orders prompted physicians to check off which therapists should see patients. Discharge planners emphasized the importance of standard orders for improving the quality of care for patients and maximizing their potential for recovery: “We want to get these people early mobilized and get them up and moving as quickly as possible, because that helps decrease the disabling effects of stroke. So, we added [assessments] to our standard orders.”

Although the discharge planners were confident that the standard orders ensured compliance with assessing patients, several discharge planners described situations in which stroke patients could be overlooked: “somebody forgot to pull the orders,” “you have some physicians who like to write their own orders varying a little bit from the pathway,” or “maybe the doctor is being a little belligerent and doesn’t want to sign the orders.” One discharge planner described a scenario with a carotid stenosis patient that illustrated how the hospital might miss assessing a stroke patient: “…the patient didn’t go to our stroke unit because we didn’t have any beds. And so…the nurse, not usually getting this type of patient,…did not pull the stroke standard orders. So [the patient] did not get [assessed].” Despite these statements, the discharge planners still asserted that the standard orders ensured assessment rates of close to 100% and that any patients who were somehow

overlooked would eventually be assessed: “And there’s sometimes – and I’ll be honest – where a physician may not order a particular therapy and then one of the therapists [will] say, ‘Hey, I think this patient could benefit from this.’” The discharge planner used this example to illustrate the system of checks and balances (e.g., the therapist’s suggestion to the physicians) that ensures all patients are assessed.

The second factor that contributed to patients getting assessed was the need to meet admissions criteria for patients who could benefit from postacute rehabilitation in a facility. Admission to IRF and SNF was dependent on numerous factors, including clinical measures such as number of functional limitations and ability to participate in therapy sessions. Some facilities or insurance companies required patients to have assessments from physical therapists, occupational therapists, or speech-language pathologists prior to admission. Discharge planners encountered difficulties in helping patients get admitted to postacute rehabilitation facilities when patients lacked the necessary assessment information in their medical charts. When this happened, discharge planners followed up with the physicians to make sure the assessments were ordered: “If the nurses or physicians…don’t catch those [patients] for whatever reason, our resource management backs that up…. you have to have all three of these evaluations [physical therapy, occupational therapy, and speech-language pathology] for these facilities to look at.”

Sometimes patients’ conditions influenced whether they were assessed. For example, one discharge planner explained that a patient with severe pre-stroke disabilities (e.g., “a paraplegic or something like that”) would not be assessed because the assessment “would be of no benefit to determine their physical abilities.” Sometimes patients were not assessed because they were unable to participate in a formal evaluation:

> Like if the doctor ordered bed rest on the patient…or some reason why the [therapist] wouldn’t be able to get the [patient] up. Then they would postpone it [and] the doctor would have to reorder the PT [physical therapy] evaluation.

While poor clinical conditions could preclude patients from being assessed, none of the discharge planners discussed situations in which patients were not assessed because it was clear that they did not have any functional limitations. In fact, one discharge planner had this to say on the topic: “Even if a patient comes into the ER with symptoms of a stroke and by the time they get to the floor, their symptoms are resolved…they still do a PT/OT [physical therapy/occupational therapy] evaluation.”

Discharge Destination

The second theme in this study was related to discharge destination. Six factors influenced how discharge decisions were made: 1) clinical indicators; 2) patient preferences; 3) patient support systems; 4) financial considerations; 5) availability of services; and 6) hospital affiliations with postacute facilities. Patient clinical indicators were the primary factor used to make initial recommendations regarding discharge destination. Clinical indicators included the patient’s level of functioning and disability, the number and intensity of comorbidities, the ability to participate in rehabilitation therapy, and the probability of physical improvement. At some hospitals, therapists were primarily responsible for making initial discharge recommendations but at other hospitals, providers had the lead role in making recommendations. Often, recommendations from both therapists and physicians were considered:

> A lot of times the doctors go along with the therapists, but sometimes the doctors may have a difference of opinion, too. Like the therapists may say somebody needs acute rehab and the doctors may say, “Well, I think they are a little bit too weak right now. Let’s go ahead and do home health and then advance to outpatient.”

Discharge planners consulted with therapists and physicians to identify the most clinically appropriate rehabilitation options, and then they worked with patients and families to facilitate transitions to these postacute settings.

Patient preferences were also considered one of the most important factors in making discharge decisions since, as one discharge planner stated, "if they don't agree, then we can't do anything." Discharge planners took a patient-centered approach to making discharge decisions:

> Our main goal is to let the patient and/or family know what their options are, because they're gonna have input. We're not gonna tell them what they have to do. I want to first hear what they want to do and then we can go from that.

Patient preferences were motivated primarily by their personal rehabilitation goals and their desire to go home or to a facility. The importance of patient goals was exemplified through this comment: "The family, patient, and myself sit down and decide what goals the patients themselves have. And we sit down with families and basically decide together what they want." In this example, patient goals were the primary factor that influenced the discharge decision-making process, but these goals were considered within the context of the family and the discharge planner's professional opinions. Another comment showed the importance of patient preferences for going home versus a facility:

> Of course, whatever the professional people think is still ran by the patient and their family to see if this is something that they want to do because sometimes people say, "Well, I'm tired of being in the hospital. I don't want to be in another facility. I want to go home."

When patient preferences conflicted with clinical recommendations, discharge planners used their influence to convince patients which discharge destination they felt would be most appropriate. One discharge planner gave this example:

> If a little old lady lives at home with her husband but prior to [her stroke] she was having to take care of him, she obviously wouldn't be able to take care of him in her debilitated state. So, my question is then to the family: "Okay, if she takes care of the husband at home, that's probably gonna be awhile before she can do that. Do you think it's appropriate for her to go home…or do you think it's more appropriate for her to go to a nursing home for a short period of time to get stronger before she comes back home?"

In this example, the discharge planner used a loaded question to influence the patient's preferences and guide the family into a making a decision she felt was more appropriate for the patient.

Patient support systems were another important consideration when making discharge decisions, particularly when patients wanted to go home. Discharge planners used discussions with patients and families to determine if adequate support was available to meet patient needs:

> There's a few vital pieces of information. One is, what was your home situation prior to coming into the hospital and what support is realistically going to be available once you leave the hospital? I…tell [families], "I don't want to hear what you'd like to do. I want to hear what you realistically can do."

As one discharge planner noted, support systems are critical in deciding if patients should go home:

> Every person is different. I mean, one person who is…not doing well at all still might have family that are devoted and want to take them home and are able to do that kind of work. And you might have someone who is walking really well with a walker and just needs someone to kind of make sure that they don't have a fall or assist them with bathing and dressing and they don't have it. So they still can't go home. The person's support system and their environment plays such a big role into where they go…

The presence of family support systems was important, not only for discharge home, but also for discharge to certain facilities. For example, one discharge planner described criteria for admission to IRF:

> One of our criteria is that they have the family support….If it looks like they don't have the support and they're gonna go to a nursing home for their long-term needs…then we likely are not gonna accept them to rehab. So that's another discharge criteria. It's not the main thing but it's something we look at.

In this quote, the discharge planner noted that IRF will sometimes deny otherwise eligible patients, because they don't have support systems in place to care for them when they leave the facility.

Financial considerations also influenced discharge decisions, since paying for

services was a major concern for many patients: “Worry about finances is usually a number one factor. ‘How much is this gonna cost? Is the insurance gonna pay?’” As one discharge planner stated,

> I don’t care if it’s stroke or anything that’s out there. You need care but some of your care depends on what kinda money you got, too. And it’s sad that the system is that way…but your discharge plan can be greatly impacted [by] what your financial situation is.

Financial considerations often precluded patients from going to certain discharge destinations: “We’ve had people who have no insurance at all and no nursing home is gonna take a self-pay person that can’t give ‘em some money up front.” One discharge planner expressed her frustration with the difficult financial decisions patients often make because they lack adequate insurance coverage to cover needed care:

> Once your Medicare days are up, if you don’t have a supplement and if you’re gonna become Medicaid, then your monthly Social Security check is gonna have to go to the nursing home….You have families not wanting anyone to go to the nursing home, because they want that check to stay at the house because so many folks are living off that income….And some patients will tell you that. They say, “But if I go and my check goes, I can’t pay my rent [or] my supplemental insurance. What am I gonna do?” Well, Medicare, the government doesn’t care…but *I* care because that patient is not gonna get the care they need.

The availability of services in a particular area was also a factor in making discharge decisions, particularly in rural areas where certain facilities or services were not available. For example, a discharge planner who assists rural patients noted that she has to consider if patients “even have…the services in their rural area, because you would not believe there’s so many rural areas and rural hospitals out there that don’t offer all the therapies that they need…” Another discharge planner at a rural hospital talked about strategically recommending facilities closest to the patient. Concerns about availability of services were not expressed by discharge planners in urban areas.

The last factor that influenced discharge decisions was the hospital’s affiliation with postacute facilities. This factor was not mentioned by most discharge planners, but two

worked at hospitals that were affiliated with IRF. At these hospitals, the affiliations with IRF could potentially influence discharge decision-making: "Sometimes [the therapist] straddles with SNF versus acute rehab. And a lot of times the determining factor is, we'll go ahead and start with the acute rehab because we have acute rehab facilities." A quote by another discharge planner indicated that, although the hospitals wanted patients to utilize their postacute facilities, there were mechanisms in place to prevent inappropriate use of services:

> I guess people would think. "Well, they want those patients *there*, so they can get the money for it," and that's true. *But* it doesn't matter. They have to meet the criteria…or Medicare or insurance is not gonna pay you. So, it doesn't benefit us to send our patients up there if they don't meet criteria.

A similar sentiment was expressed by a discharge planner whose hospital had home health services: "…patients and family are given a list of home health agencies. We cannot tell them a particular agency to chose. We do have a home health agency…and of course that's noted on the form." In this example, full disclosure of the hospital's affiliation with the home health agency was required and discharge planners were prohibited from using their influence with patients and families to promote the hospital's home health services.

Because of the complexity in the discharge decision-making process, discharge planners were asked if they utilized guidelines to help guide them through the discharge planning process. Most discharge planners reported that they did not use guidelines. They felt guidelines were not necessary, because they had already acquired the skills they needed to be effective discharge planners during their tenure at the hospital. One discharge planner explained that, "most of our [discharge planners] have been doing this for about 10 to 15 years, so they pretty much know without having to look at a piece of paper what to look for." Another quote expressed a similar sentiment that discharge planners did not need guidelines to be effective: "I think that's just a social work kind of skill." Still another discharge planner described why she did not need guidelines:

> We have no forms…I go in with the demographics sheet and the little bit of information that I've gotten from the chart, from the doctors and stuff, and just ask the questions that lead me from one to another. And we know what to look for.

Racial Differences

The third theme of this study was related to racial differences in being assessed and in deciding on discharge destinations. When asked what factors might contribute to racial differences in which patients get assessed, most discharge planners noted that they did not observe racial differences in which patients were assessed at their hospitals. Therefore, they were unable to guess what factors might contribute to racial differences at other hospitals. Furthermore, they did not think there were reasons why any patient, regardless of race, would not get assessed. One discharge planner made this attempt at understanding the reason for racial differences in which patients get assessed: "I don't want to say lack of education from the staff. I think maybe from the patients asking for things, maybe. Their lack of knowledge is the only thing I could think, maybe."

Discharge planners were also asked what factors might contribute to racial differences in discharge decision-making. For example, they were asked to identify racial differences in how families made discharge decisions. The discharge planners reported that, because they were "not really seeing any racial differences," they were unable to offer any possible explanations for racial differences in discharge destination. One discharge planner initially acknowledged there might be racial differences: "I'm sure there may be some subtle things that I just don't pick up on." However, she later said she did not think any racial differences existed.

Discussion

Hospital discharge planners play a key role in helping stroke patients transition within and across health care settings. They monitor stroke patients as they transition throughout

acute care hospitals and help patients and their families coordinate transitions from hospitals to home or postacute facilities. This paper presented data from interviews with discharge planners at nine hospitals in North Carolina. The interviews were used to identify the factors that influenced whether stroke patients were assessed for disability and the factors that influenced where patients were discharged. The interviews also attempted to investigate factors that might contribute to racial differences in assessment and discharge destination.

The first theme in this study addressed post-stroke assessments. Results from this study pointed to three factors that influenced whether patients were assessed for disability while hospitalized for stroke: standard orders for stroke, the need to meet admissions criteria for postacute facilities, and patient conditions. Standard orders for stroke were used to ensure that all stroke patients were assessed. At some hospitals, standard orders included alerting all stroke personnel (e.g., therapists, neurologists, etc.) when patients were admitted with symptoms of stroke. At other hospitals, standard orders were used to prompt physicians to request assessments from therapists. All of the discharge planners were confident that by having standard orders for stroke, their hospitals were certain to achieve perfect (or near-perfect) assessment rates. However, the information they provided pointed to several ways in which stroke patients could be overlooked for assessment despite having the standard orders. First, at hospitals that rely on the physicians to order the assessments, patients may not get assessed if physicians forget or decide not to use the standard orders. Second, patients may not get assessed if they are admitted to parts of the hospitals where clinicians are not familiar with the stroke standard orders or are not as sensitive to the need to assess stroke patients. This could be particularly problematic at large hospitals where stroke care providers are unaware about patients who are placed outside their units. Third, patients may not get assessed if they are too debilitated for the therapists to conduct the assessments. Although discharge planners reported that assessment for debilitated

patients would be postponed and not canceled, the problem of not being assessed at all is likely to be higher for these patients. In some cases, discharge planners may be alerted that patients have not been assessed when trying to facilitate admissions to postacute rehabilitation facilities, particularly IRF and SNF. In this way, discharge planners may sometimes serve as advocates who ensure that patients are assessed. However, patients who were not assessed because of poor health conditions early during their hospital stay may not benefit from this advocacy. Because of their poor condition, they may be less likely than other patients to be eligible for facilities such as IRF that require assessments.

Although some hospitals did not have standard orders for stroke, discharge planners at these hospitals were still confident that all their stroke patients were assessed. Future research should determine if likelihood of being assessed increases when hospitals have standard orders for stroke. The presence of standard orders for stroke may be a better predictor of assessment than hospitals characteristics such as profit status, teaching status, or size. Additionally, whether a hospital is considered a stroke center may also be a more important predictor of whether patients are assessed. Because hospitals that are considered stroke centers must report their performance on key acute care measures such as assessing patients, they may have more incentive to be diligent about assessing all patients.

The second theme in this study was related to discharge destinations. Six factors influenced discharge decisions: clinical indicators, patient preferences, patient support system, financial considerations, availability of services, and hospital affiliations with postacute services and facilities. The factors varied with respect to how much they influenced discharge decisions. Patient clinical indicators were the primary factor therapists and physicians used to make initial recommendations regarding discharge destination. The clinical indicators they considered (e.g., level of functioning and disability, ability to participate in therapy, etc.) were necessary to determine if patients were well enough for a

safe discharge home or required postacute care in rehabilitation facilities. Discharge planners discussed discharge options with patients and their families and helped them make clinically appropriate discharge decisions consistent with patient goals and preferences. When patient preferences were not aligned with clinical recommendations (e.g., a disabled patient who needed intense therapy at a facility preferred instead to go home), some discharge planners employed strategies to guide patients and families into making more clinically appropriate decisions. Hospitals should ensure that all discharge planners are equipped with strategies they can use to help educate patients about the various discharge options that exist, the types of care provided in each setting, and the criteria patients must meet to be good candidates for each option. Discharge planners should also be taught how to balance helping patients and families make sound decisions with respecting their preferences even when these preferences go against medical advice.

Patient support systems were also a key consideration when making discharge decisions. Discharge planners assessed families' willingness and ability to provide adequate support for patients to ensure a safe discharge home. None of the discharge planners reported counseling family members on how to be successful caregivers. Because strokes are unplanned and unexpected events, family members are thrust abruptly into roles as caregivers with minimal support and preparation (Smith, Lawrence, Kerr, & Langhorne, 2004). Often family members do not have adequate knowledge or training on how to assist patients with critical activities such as bathing and administering medication (Kerr & Smith, 2001). Furthermore, family members do not receive any information or assistance about how to access health care services, obtain financial assistance, or cope with the emotional and physical burden of caregiving (Cameron, Tsoi, & Marsella, 2008; Kerr & Smith, 2001). While discharge planners assessed the availability of support, it was not clear if they also determined the quality of the support available for patients. Interestingly, social support was also a consideration for discharge to IRF. Specifically, IRF wanted to be sure that patients

would be discharged from facilities to a safe and supportive environment that would foster and enhance the gains patients made while in the facility.

Discharge destinations were influenced by several factors related to access to care. For example, some patients were good candidates for postacute rehabilitation facilities but lacked adequate insurance coverage to cover the costs of care. Furthermore, some patients may not receive services because they are not available in their area. This may be particularly problematic for patients living in rural areas. These findings are important because they indicate that some stroke patients may not receive needed services due to financial limitations that prevent access to care or due to lack of available services in their geographic area. Additional research is needed to determine the extent to which patients are unable to access needed services and the impact that lack of access has on health outcomes for stroke patients.

The third theme focused on racial differences in post-stroke assessments and discharge destination. None of the discharge planners were able to identify factors that could contribute to racial differences in assessment or discharge decision-making. They reported that they did not observe racial differences in their hospitals and therefore, were unable to speculate why racial differences might exist at other hospitals. Despite the discharge planners' beliefs, previous research by the author and others indicates that racial differences may exist in these areas of rehabilitation utilization.

Discharge planning guidelines are one way to ensure that patients receive all the recommended information and assistance they need for an optimal transition home. Research shows that a discharge checklist of elements to communicate at discharge might be helpful in standardizing the discharge process and improving the quality of transitional care for all patients (Halasyamani et al., 2006). Unfortunately, discharge planners did not think such a checklist was necessary and seemed resistant to the idea. These findings indicate that if hospitals are to implement discharge planning guidelines, they should work

closely with discharge planners to get input and buy-in. Furthermore, discharge planning guidelines might be best for new discharge planners who are not yet familiar with all the ins and outs of discharge planning.

This study had three major limitations. First, this study has limited external validity beyond stroke care and discharge planning in North Carolina. The sample included a small number of discharge planners in the state and their responses may not be representative of other discharge planners at different hospitals and may not reflect discharge planning for patients who did not have a stroke. Second, discharge planners may not have been as knowledgeable about factors that influence whether patients are assessed as the providers who actually conduct the assessments. Third, this study only included data on participants' reflections on the discharge planning process. Participants' accounts of the discharge planning process may not directly match what they actually do in practice. Additional research is needed to examine how discharge planners interact with patients and families in practice.

In summary, discharge planners play a critical role in coordinating transitional care for stroke patients. The findings from this study provide evidence about the factors that contribute to post-stroke assessments and discharge decision-making for stroke patients in North Carolina. Although the findings from this study did not point to factors that contribute to racial differences in rehabilitation utilization, previous research has shown that racial differences do exist. Therefore, additional research is needed to help explain the factors that contribute to these differences. These findings have important implications for the need to improve the quality of transitional care.

CHAPTER 6

CONCLUSION

Summary of Findings

This dissertation provided an in-depth investigation of the relationship between race and stroke rehabilitation utilization. Study 1 used logit models to examine the relationship between race, hospital characteristics, and whether patients were assessed for disability during acute hospitalization for stroke. Study 2 used multinomial logit models to examine the relationship between race and discharge to home, IRF, or SNF. Study 3 used interviews with discharge planners to build upon and further explain the work in Study 1 and Study 2. Specifically, discharge planners were asked to identify and describe important factors that impact whether stroke patients are assessed and how discharge decisions are made.

Study 1 showed that 92% of patients were assessed for disability following a stroke. These results indicated that hospitals in North Carolina are doing a fairly good job of assessing patients. However, since all patients should be assessed, the hospitals still have some room for improvement. The likelihood of being assessed was positively associated with age, length of stay, and diagnosis of an ischemic stroke rather than a hemorrhagic stroke. The main hypothesis for Study 1 was that Whites would be more likely than African Americans to be assessed. Contrary to this hypothesis, Whites were less likely than African Americans to be assessed. Because African Americans have a greater incidence and severity of stroke as well as more post-stroke disability, therapists and physicians in North Carolina may be more sensitive to the need to assess African Americans compared to Whites. Study 3 showed that discharge planners' attempts to meet admissions criteria for

postacute facilities was a factor that influenced patient assessments. Because Whites may have been less likely to need postacute rehabilitation in a facility, discharge planners may not have been looking for assessments in their medical charts. Without recognizing that White patients had not been assessed, discharge planners may not have been alerted to the need to prompt physicians to request or conduct assessments. One important factor to consider is that the differences between Whites and African Americans, although statistically significant, were relatively small and may not be significant from a practical perspective.

Although the overall percentage of patients being assessed was high, the probability of being assessed varied based on hospital characteristics. Urban, not-for-profit, teaching, and large hospitals were hypothesized to have a higher probability of assessing patients. No differences existed based on urban location of hospital. However, not-for-profit, non-teaching, and large hospitals were more likely than for-profit, teaching, and small hospitals to assess patients. The probability of being assessed at for-profit, teaching, or small hospitals was less than 87%. Furthermore, there was an interactive effect between race and hospital characteristics. For example, while African Americans had a higher overall probability of being assessed, African Americans at for-profit hospitals had the lowest probability of being assessed (82.2%). African Americans at for-profit hospitals were 12.4 percentage points less likely to be assessed than African American at not-for-profit hospitals. These results indicated that for-profit hospitals were not good at assessing patients and were especially bad at assessing African American patients.

Study 2 showed that most patients are discharged home (54.8%), followed by discharge to IRF (24.9%) and SNF (20.3%). The hypotheses for Study 2 predicted that Whites would be more likely to be discharged home and to SNF, while African Americans would be more likely to be discharged to SNF. Results indicated that Whites were more likely to be discharged home, while African Americans were more likely to be discharged to IRF and SNF. The probability of being discharged to a facility versus home was associated

with hospital characteristics. Most notably, teaching hospitals were more likely than non-teaching hospitals to discharge patients to home. Furthermore, access issues influenced discharge destination, particularly with respect to discharge home versus to IRF. Results from Study 3 provided some insight into these findings. Discharge planners mentioned several factors that contribute to discharge destination but were not completely controlled for in the multinomial logit models. First, African Americans may have been more likely to be discharged to facilities because they had more severe disabilities as a result of their strokes. The analyses attempted to control for stroke severity by using length of stay as a proxy measure, but this variable may not have sufficiently controlled for severity. Second, African Americans may have been more likely than Whites to prefer to be admitted to facilities rather than home. African Americans may have been more likely to prefer discharge to a facility rather than home because of their increased need for therapy to help them recover from functional deficits following stroke. This explanation makes sense for why African Americans would be more likely to go to IRF but is less likely to explain their higher likelihood of being discharged to SNF. Previous research has shown that African Americans receive worse care at SNF and have more negative outcomes compared to Whites. Third, African Americans may lack the family support needed to return home after stroke. Caregiving after a stroke is often an around-the-clock job, and African American patients may have been unable to identify family members who were willing or able to take on that task.

Limitations

The findings from this dissertation should be considered in light of several limitations. For example, the external validity of this dissertation is limited. The hospitals that participated in the NCCSR may have differed from hospitals that did not participate in the registry. Compared to other hospitals, the hospitals that participated in the NCCSR may

have had more resources to devote to stroke care, may have been more invested in providing high-quality stroke care, and may have had a higher level of commitment to implementing stroke care guidelines. All of these factors could limit the generalizability of the findings to other hospitals in North Carolina. Furthermore, the results may not be generalizable to hospitals outside of the state. Approximately, 3% of North Carolina residents have had a stroke, and the age-adjusted stroke rate in North Carolina is approximately 22% higher than the national average (Huston, 2008). North Carolina is also located in the buckle of the Stroke Belt, which has the highest incidence of stroke in the nation (Howard et al., 2007). Because of the high incidence and prevalence of stroke in North Carolina, stroke care providers may be more knowledgeable and experienced in stroke care and rehabilitation compared to providers at hospitals in other states. Similarly, data from the interviews with discharge planners may not be generalizable to discharge planners at different hospitals or in different states, may not reflect the factors that influence assessments and discharge planning for patients with other illnesses, and may not reflect the experiences of discharge planners outside of hospital settings (e.g., discharge planners who work at IRF).

Several important variables were omitted from the analyses. First, only four important hospital characteristics were included in the analyses (i.e., urban location, profit status, teaching status, and size). Other hospital-level characteristics, such as the type and amount of resources devoted to stroke care, specialized stroke knowledge and experience, and cultural competence with respect to treating patients of different races and cultures, could have impacted assessments and discharge destination but were not available in the dataset. The initial data analysis strategy included hospital fixed effects to control for hospital-level factors that were not specifically included in the analyses. However, the statistical models that included hospital effects were unstable and would not run properly. Therefore, they could not be used in the analyses.

Second, this dissertation lacked a direct measure of stroke severity. Stroke severity is an important variable because it has a direct impact on patient clinical measures such as level of disability and functioning, which can influence both assessments and discharge destination. For example, patients with severe strokes may be more likely to be discharged to a facility instead of home. The National Institutes of Health Stroke Scale is the optimal measure of stroke severity. A stroke scale variable was available in the NCCSR, but because many hospitals do not administer the scale to their patients, there was a great degree of missing data on this variable. Length of stay was used as a proxy measure for stroke severity. Although length of stay is correlated with stroke severity, this study is limited in that length of stay does not provide a perfect estimation of stroke severity.

Third, the insurance variables were not well-defined. While one insurance variable indicated whether patients had Medicare, the other insurance variable indicated whether patients had any other type of insurance instead of or in addition to Medicare. The "other insurance" category did not specify if patients were insured through a public (e.g., Medicaid) or private payer, nor did it specify the type of insurance plan patients held (e.g., preferred provider organization, health maintenance organization, etc.). Type of insurance would have been particularly relevant for Study 2, since insurance companies may differ on how they make decisions with respect to which postacute rehabilitation services they are willing to pay for.

This dissertation was also limited by small sample sizes. Although Study 1 and Study included a large sample of patients (9,258 and 8,770 patients, respectively), the data were collected from only 35 hospitals. Inclusion of more hospitals would have made the data more representative of the hospitals in the state. Additionally, the number of patients at each hospital varied considerably from less than ten to several hundred. This could have potentially impacted results, since conclusions were sometimes made based on data from a small number of patients.

Lastly, Study 3 was limited by two factors. First, discharge planners were asked about the factors that contribute to whether stroke patients are assessed but they do not actually perform the assessments. The discharge planners included in the study were knowledgeable about various aspects of stroke care, so their reports provided some useful insight into the factors that contribute to assessing patients. However, because they do not actually conduct the assessments, they may not be aware of all the factors that influence whether patients are assessed. Second, the study only included discharge planners' reflections about the factors that influence the discharge planning process. In practice, additional factors may impact how discharge decisions are made.

Policy Implications and Future Research

This dissertation contributes to the understanding of racial differences in the utilization of stroke rehabilitation services, namely assessment for disability and discharge destinations. Although most stroke patients in the sample were assessed for disability, the number and type of assessments they received were not known. Stroke patients can be assessed by a variety of providers, including physicians, physical therapists, occupational therapists, and speech-language pathologists. At some hospitals, stroke patients are assessed by only one provider and at other hospitals, patients receive assessments from multiple providers. The number and type of assessments patients receive is important, because each type of assessment is able to identify different kinds of deficits. Patients who do not receive multiple types of assessments may not be fully aware of certain types of deficits and may not receive necessary and appropriate rehabilitative care to address those issues. For example, patients assessed by physical therapists but not occupational therapists may not be approved for rehabilitative therapy to address deficits in their fine motor skills. Future research should determine the types of assessments patients receive and which types of providers are conducting the assessments.

Results from this dissertation pointed to racial differences in discharge destination. Specifically, Whites were more likely to be discharged home, and African Americans were more likely to be discharged to IRF and SNF. The interviews with discharge planners did not provide significant insight into why racial differences exist in discharge destination. Therefore, it is not clear whether racial differences in discharge destination are based on clinical appropriateness (e.g., due to level of functioning and need for rehabilitation), patient and family characteristics (e.g., preferences for discharge destination, level of support available at home), or factors related to access to care (e.g., availability of facilities nearby, insurance status). Additional research is still needed to determine if the differences in discharge destination are clinically appropriate or if they reflect disparities in utilization.

Further research is also needed to determine the pathways through which hospital characteristics impact utilization of rehabilitation services, especially post-stroke assessments. Results from this dissertation point to differences in assessment that vary based on both race and hospital characteristics. It was not clear from this research if the differences were actually due to the hospital characteristics included in the analyses (i.e., urban location, profit status, teaching status, size) or if they were due to another factor that was unmeasured. Study 3 pointed to the idea that the presence of standard orders for stroke is a hospital-level factor that impacts whether patients are assessed. Whether hospitals have standard orders for stroke could be a more significant predictor of whether patients are assessed than the hospital characteristics controlled for in this dissertation. Future research should control for this variable by including a dummy variable to indicate whether hospitals have standard orders for stroke. If standard orders are confirmed to increase likelihood of assessment for all stroke patients, then other hospitals should develop and implement standard orders.

APPENDIX

INTERVIEW PROTOCOL

Date:

Participant Name:

Participant Address:

Interview ID:

Hospital Name:

☐ Urban ☐ Teaching
☐ For-profit ☐ Large

Script: Hello again, and thank you for taking the time to participate in this study! Today, I will be talking to you about stroke care and rehabilitation in your hospital and your role in that process. There are no right or wrong answers, so please feel free to share your opinions and any other information that you feel is important. As a reminder, your participation in this study is completely confidential, and neither your name nor the name of your hospital will be used when the findings from this study are reported. I will be taking some notes during our discussion, and as you know, I will also be tape-recording this session to make sure I don't miss any of your comments. Please try to speak loudly so the tape recorder is able to pick up all of your responses. Do you have any questions before we begin? Great! This interview will last 30-45 minutes, so let's get started!

- **Briefly describe your professional background and position in this hospital.**
  - Probes: What is your official title? How long have you been in that position? How, specifically, are you involved with stroke care?

- **Please describe the demographic characteristics of the stroke patients at your hospital.** (examples: age, gender, race, economic status, insurance type, education level, health status/co-morbidities, etc.)

- **Approximately how many stroke patients are treated at your hospital each year?**

- **Do the stroke patients admitted to your emergency department generally reside within this county?**

- **What are the priority diseases that your hospital focuses on?**
    - Probes: Why do you think your hospital selected those diseases to focus on? (*If stroke not a priority*) Why do you think stroke is not a priority disease that your hospital focuses on?

- **Briefly describe what happens to the patient from the time s/he is admitted to the hospital for symptoms of stroke to the time s/he is discharged from the hospital?**
    - Probes: You mentioned (*list providers*). What other kinds of providers at your hospital are involved in stroke care and rehabilitation? Do you have a stroke unit, or a particular floor where stroke patients are always admitted?

- **Does your hospital have guidelines for treating stroke patients?**
    - Probes: (*If yes*) What are those guidelines? Is it your sense that the guidelines are consistently and universally implemented? What makes you think so, or Why not? In your opinion, how would you rate the hospital's level of commitment to implementing those guidelines?
    - Probes (*If no*): Why do you think your hospital does not have treatment guidelines? Do you think guidelines would be helpful? Why or why not?

- **What kinds of stroke rehabilitation services are available at your hospital?**
    - Probes: What kinds of equipment, resources, and/or personnel are devoted to stroke care and rehabilitation? What proportion of stroke patients use these rehabilitation services?

- **How do you determine what kind of rehabilitation services, if any, a patient needs?**

- **Are all stroke patients routinely assessed for rehabilitation services?**
    - Probes: Approximately what percentage of patients would you say are assessed for rehabilitation services? Why aren't all patients assessed? How do you determine which patients receive an assessment? Are there certain types of patients (e.g., with respect to specific demographic characteristics) who are more likely to be assessed? Why or why not?

- **Do you think there are racial differences with respect to whether or not patients are assessed for rehabilitation services?**

- **How are decisions made regarding where stroke patients are discharged?**
    - Probes: What are the most important factors that determine discharge destination?

- **Are there racial or ethnic differences in terms of how discharge decisions are made and/or the factors that go into making discharge decisions?**

- **What other topics are discussed with patients and their families prior to discharge?**
    - Probe: Do you counsel patients and families about secondary prevention? Do you give patients materials? Is there any follow-up after patients leave the hospital? Do you have guidelines or a protocol that lists what to discuss with patients?

- **This hospital is (*urban location*), (*profit status*), (*teaching status*), and (*size*). How do those characteristics affect whether or not patients are assessed for rehabilitation services? Affect where patients are discharged to?**

- **Before we end this interview, I want to get your opinion of some of the results I've found from my preliminary data analysis. My preliminary results suggest (*summarize preliminary results*). Why do you think that is the case?**

- **What do you think is the biggest challenge to stroke care at this hospital, or the area that needs the most improvement?**

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